SHORT HISTORY OF AMERICAN RAILWAYS

SLASON THOMPSON

U.S. History
Coll

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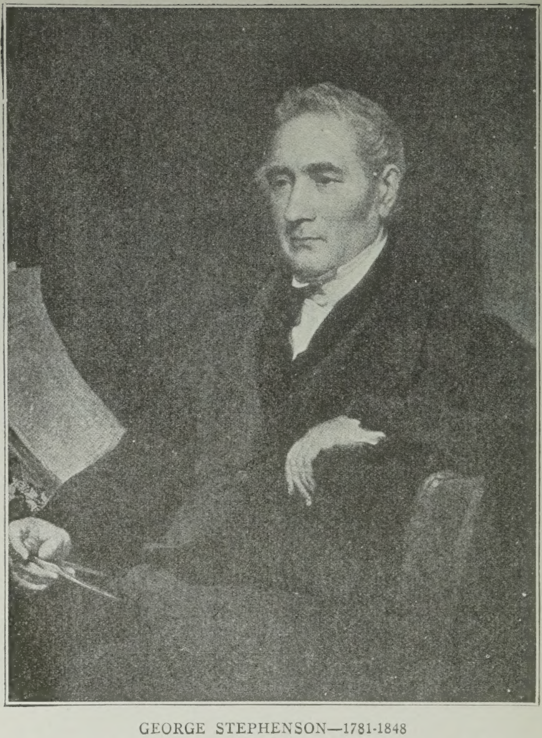
A SHORT HISTORY OF AMERICAN RAILWAYS



GEORGE STEPHENSON—1781-1848
Inventor and First Practical Demonstrator of Steam Locomotives

Painted by H. P. Briggs, R. A. *Engraved by C. Turner, A. R. A.,* 1838
—From "A Century of Locomotive Building by Robert Stephenson & Co."

A SHORT HISTORY OF AMERICAN RAILWAYS

COVERING TEN DECADES

BY
SLASON THOMPSON

WITH 400 ILLUSTRATIONS

Second Edition—Revised and Corrected
Thirteenth Thousand

CHICAGO
BUREAU OF RAILWAY NEWS & STATISTICS
1925

Press of
Tucker-Kenworthy Co.
Chicago

To

The Two Million and More Railway Employes
and Their Allied Workers in the
United States
upon whose continuous energy and vigilance
rests the unending task of carrying on
by day and by night
our continental transportation service
with promptness, speed and safety
unparalleled in the history
of the World

THIS BOOK IS
RESPECTFULLY DEDICATED

PREFACE TO THE SECOND EDITION

WHEN the first edition of this short history was sent to press without the customary preface, it would seem that the second might follow similarly bereft. But since the favorable comment it evoked has almost universally been accompanied by the remark that it furnished a much needed chapter to the wondrous story of the republic, a few words may be added to emphasize the dereliction of American historians.

In Justin Winsor's monumental "Narrative and Critical History of America," neither in the indices to the eight quarto volumes nor the general index for the whole work does the word Railway appear. Other historians have not been so exclusive in their narratives but none of them has paid anything like proportionate attention, much less homage, to the one industry that has brought all other industries on this continent within trading distance of each other.

This omission probably accounts for President Coolidge's failure to recognize, in his noble memorial address at the Minnesota State Fair on June 8th last, the coincidence of the centennial there celebrated with the demonstration of steam and rail transportation on the Stockton & Darlington Railway, September 26, 1825. Until the railways came, the coming of the first shipload of Norse immigrants into New York in that year, so splendidly recounted by the President, would have been an insignificant event in the expansion of the republic. The landing of a ship's company of fifty-two souls who quickly found homes on the thickly wooded frontier of New York state was of small significance in the settlement of America until the rails came to carry them and their descendants and successors on to Illinois and later on to Minnesota and the Dakotas. Not until after 1840 was there a mile of railway in Illinois, and not until after 1860 was there a mile of railway in Minnesota or either of the Dakotas. As told in these pages, the first locomotive to reach St. Paul got there by boat in

1860; and immigration returns record that Norse immigration first assumed noteworthy proportions in the following decade.

Glancing over the printed pages of this "Short History" the writer is conscious of how far it comes from filling the gaps in the general histories of the United States. As the reviewer for the San Francisco *Chronicle* says, it merely "hits the high spots." The true history of American railways is to be found in the valleys—following the meandering rivers and rivulets and seeking the lowest grades across or through the intervening heights.

The American Railway Association might well devote a share of its activities to assembling the histories of its 200 Class I roads into a story of that "magnificent and wondrous adventure," the making of the railways of America, with at least one chapter given to the rescue of our Sister of the Snow from the long haul of the toboggan and the dog train.

In the following pages have been incorporated some forty-five corrections kindly pointed out by readers in response to the invitation on the flyleaf of the first edition. While the majority of these were palpable slips of the proof reader, one was in a material feature involving the substitution of a small cut of "Old Ironsides" for that of George Stephenson's "Planet" 1830. This was the more regrettable because the "Planet" was the real prototype of the early locomotives built in America. The interested reader can observe the resemblance in the cuts as they appear in this edition.

The reception of the "Short History" by the press, railway officials and the general public has been most gratifying.

SLASON THOMPSON.

August, 1925.

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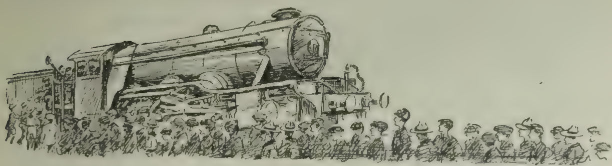
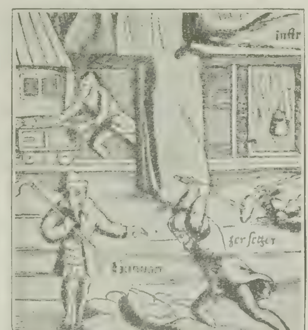


LIFE ON THE FOOTPLATE: EVERY BOY'S DREAM OF BLISS
From Punch by Permission.

> Monday 21st (March) We went over in a Canoe & travell'd up Maryland side all y. Day in a Continued Rain to Coll Cresaps right against y. Mouth of y. South Branch about 40 miles from Polks I believe y. worst Road that ever was trod by Man or Beast.
>
> —*Washington's Journal, 1747-8.*

WHEN I was a small boy, Noah's Ark was the most cherished plaything of boys and some girls. Today no boy is satisfied until he runs a train of cars, while his sister clings to her dolls—rag, French or talking,—as her parents' purse can buy. From the days of the deluge to those of George Stephenson (1821) water afforded the easiest form of transportation, and according to some theorists water has gridironed the landscape of the United States ever since.



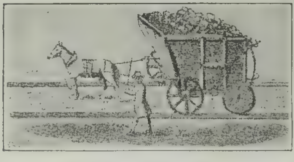
THE FIRST CAR ON RAILS
Note the car on wheels and rails in the background
From German Print of 1550

One hundred years ago there was not a mile of railroad track on this continent,

and little more on any other continent, for that matter. Now there are over 400,000 miles of track in the United States alone.

When George Washington anticipated the advice of Horace Greeley, "Go West, young man," he had to play the part of baggage car for his only change of clothing, and many a night he went to sleep with nothing above him but the watchful stars—and the voices of the night were not too friendly in those untrodden wilds.

Washington visited the site of Pittsburgh in 1753, 1755 and 1770, but his prophetic vision could not anticipate how its destiny was to depend on the rail, and not on the merging of the Monongahela and Alleghany rivers into the Ohio. The site he chose for a fort has become the second railway center in the world. In 1774 the government sold land in the immediate vicinity of Pittsburgh "at ten pounds per one hundred acres," or 50 cents an acre. The first mail route by horseback between Pittsburgh and Philadelphia was established in 1786. To the student, whether of ten years or eighty, it is hard to visualize a map of the United States without the tracery of lines that signify railroads from Eastport, way up on the borders of Maine, to San Diego, way down on the Pacific coast of California.



EARLY HORSE RAILWAY IN GERMANY

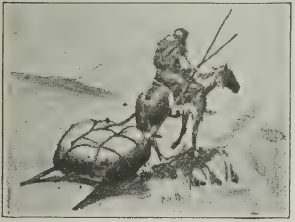
The rails were laid on each side of the road. This was a truly wide gauge track.

The schoolboy who draws an outline map of the republic showing its lakes, rivers and mountains can get a glimpse of the prospect of transportation and settlement upon which Daniel Boone and other early pioneers looked with fearless eyes. The maps of the early twenties scarcely indicated the post roads between the chief cities. The colonial conquest of America had followed Indian trails, and the opposing armies of the Revolution marched to meet each other mostly by paths and turnpike roads.

Navigable streams were unbridged, and Washington crossing the Delaware in a scow in a snow storm, as pictured, illustrated the dangers that attended land transportation along the coast in those days.

If the ocean was the highway of nations in pre-railroad days, the bays, estuaries, lakes and rivers were their byways. Until Watt invented the steam engine and Fulton hitched it to a flat boat with side wheels, navigation had made but slow progress from the days when Columbus crossed the uncharted sea with his three caravels. The three-decker men-of-war, with which Nelson checkmated Napoleon at Trafalgar and changed the course of empire, were picturesque but cumbersome things; and the passage of clipper ships across the Atlantic was a matter of weeks where it is now one of days. It all depended on how the seas ran and the winds blew.

THE LADY AND THE LOAFER
Note that in this picture of primitive freight traffic the woman has the short and heavy end of the pole.



FAST FREIGHT—AN INDIAN POLE DRAG

The settlement of America was at first restricted to boatloads that landed fewer fugitives, dissenters and adventurers in a year than a single immigrant steamer brings now in one trip.

It was steam that made the navigable waters of America really available for transportation, just as it was the steam railroad that later was to return the long reaches of these waters to the hoot of the lonely loon and the guardianship of the watchful kingfisher.

In the early days of the 19th century men and messages took from two weeks to a month to cross the Atlantic.

The amazing story of the conversion of this continent from the paralysis of "magnificent distances" to the accessible civilization of 48 states in one indissoluble Union is told in this *Short History of American Railways.* This history will not attempt to be exhaustive. It will only seek to give in outline the part played by the railways in making this continent the hive of the busiest civilization. It will touch on the high spots of the transportation industry, leaving the details to the students of particular periods that mark its progress from Baltimore to farthest Alaska. The romance of railways is engrossing, its reality is more wonderful. The romance of railway expansion was pretty nearly regulated out of railways when the fixing of rates was vested in the Interstate Commerce Commission by the enactment of the Act to Regulate Commerce.


BY "SLOW-FREIGHT" IN DAYS OF OLD

The writing of this history was easy where it dealt with the amazing development of the railways from little horse tramways, inclined planes and stationary engines to the days when its vastness invited the regulating hand of government. When the great void spaces of the continent had been explored, surveyed and largely gridironed with railway facilities, a change came over the relations of the public, the carriers and their employes, so that the writer has had to deal with controversial subjects rather than the orderly narrative of the development of the world's greatest transportation achievement. Up to the opening of this century he has felt the pleasure of historical composition, the enthusiasm of seeing a mighty subject expand through its own momentum. Since 1900 the story has been a struggle to hold a straight and sane course through the whirling waters of Niagara with rocks and shallows on either hand. The result can scarcely satisfy either side—any more than a Daniel could reconcile the animosities of the Montagues and the Capulets.

Some day carriers and employes will recognize that co-operation in service to the public is the first essential to successful railway operation. When that day comes both will

1825-1924
PHOTOGRAPH OF EARLIEST AND LATEST ENGLISH LOCOMOTIVE
Courtesy Railway Gazette—London.

unite to celebrate the conquest of a continent by men always looking forward.

The illustrations, which tell a coincident story of the conquest of a continent, are not always in immediate connection with the text, which does not always lend itself to pictorial aid.

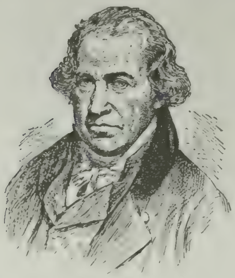
S. T.

A SHORT HISTORY OF AMERICAN RAILWAYS

CHAPTER I

BEFORE THE IRON HORSE CAME.

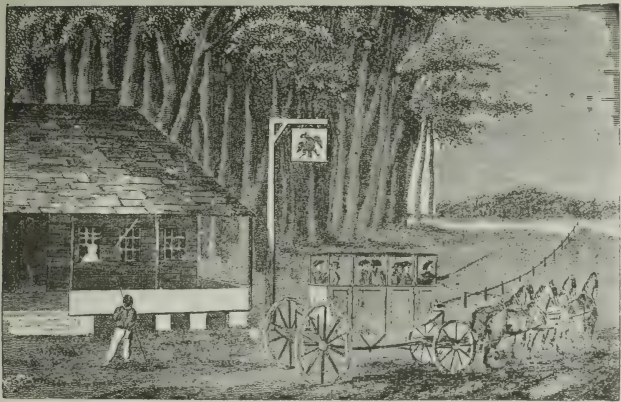
THERE are three ways of transportation known to man, yea, four—namely, highways, waterways, railways and airways. Highways, with their variants of byways, paths, trails, roads and streets, have been known to man from the dawn of time. They were first footworn across plain and mountain ridge by the passing "tread of pioneers of nations yet to be." Only as civilization wound its interminable way through the slow-moving ages did man begin to build roads to connect hamlets, towns and cities with improved means for the movement of his accumulation of goods and chattels. Passengers for centuries made their journeys on horses, mules, camels and even elephants. The walls of all times abound with the pictorial history of transportation, from the rudest sledge to the mightiest Mallet engine of today. The ox-cart, with wheels made from the cross-section of trees, anticipated the two-wheeled chariots with which the ancients raced or made war.



JAMES WATT, 1736-1819
Perfector of first practical steam engine

For the transportation of what Julius Caesar grandiloquently called his impedimenta, the Romans built those time-defying roadways whose foundations are to be traced all over Europe, even to the far extremities of Great Britain.

The evolution from primitive two-wheeled carts to the imposing stage coach of the 17th century was snail-like, apparently waiting on the development of the turnpike highway which eventually admitted of a journey of 400 miles from London to Edinburgh in 40 hours, including all stops. It is recorded that it took 400 horses—one horse per mile—in relays, to accomplish this extraordinary feat.



HOW OUR ANCESTORS TRAVELLED AND WHERE THEY FOUND "ENTERTAINMENT FOR MAN AND BEAST" BEFORE THE RAILWAYS CAME

"Until the close of the last century," says Dionysius Lardner in his "Railway Economy; a treatise on the New Art of Transport," London, 1850, "the internal transport of goods in England was performed by waggon, and was not only intolerably slow, but so expensive as to exclude every object except manufactured articles, and such as being of light weight and small bulk in proportion to their value, would allow of a high rate of transport. Thus the charge for carriage by waggon from London to Leeds was at the rate of £13 a ton, or 13½d. (27 cents) per ton mile. Between Liverpool and Manchester it was forty shillings a ton, or 15d. (30 cents) per ton mile."

In America the first stage coach was run between New York City and Boston in 1782, "probably not regularly and not long continued," says the narrative. In 1756, however, there was one stage running between New York City and Philadelphia, distance 90 miles, time three days. By 1811 there were four coaches each way on this line. The express (or "expedition") coach made the run in 12 hours, fare $8.00; the "Diligence" made it in 26 hours, fare $5.50; the Accommodation," stopping over night at New Brunswick, fare $4.50, and the "Mail Coach," traveling all night, time 17 hours. The historian adds, "At this time the coaches were poorly constructed for eight or ten passengers, each being allowed 14 pounds of luggage free. In later years the stage coach was improved, but was never agreeable, as the roads were always bad, except in the finest weather."

This highway was a part of the road General Washington took on his memorable journey from Mount Vernon to New York, whither he went to take the oath of office as first President of the United States on April 30th, 1789.

Some idea of what long distance travel in the United States of 1807 was may be gained from the account of Aaron Burr's journey on horseback under arrest from Fort Stoddard to Washington, a distance of about one thousand miles. "For days torrential rains fell; streams were swollen; the soil was a quagmire. For hundreds of miles the only road was an Indian trail; wolves filled the forest; savage Indians were all about. At night the party, drenched and chilled, slept on the sodden earth."

It was under similar conditions that earlier in the history of this continent Washington had crossed the Alleghenies and with the eye of a seer surveyed the undulating valleys of the Ohio that only needed practical transportation to become the Eden of the West. But his vision of the future only comprehended the possibility of the realization of that vision by means of hard wagon roads and waterways.

According to Mackenzie's "Historical, Topographical and Descriptive View of the United States of America, Newcastle-upon-Tyne, 1819," in 1816 there were two great post roads in

the country, "(1) That which extends from Robinstown, on the north-eastern extremity of the coast of the United States, to St. Mary's on the south-eastern extremity; and (2) The road which extends from Washington to New Orleans. The length of the first is 1733, that of the second, 1233 miles."

On these roads the mail traveled at the rate of from 60 to 120 miles a day; "on the cross roads its progress is about 40 miles in the same time."

Mr. Mackenzie adds: "The following regulations concerning this establishment (the general post office at Washington) were adopted by an Act of the American Congress on the 9th of April, 1816:

	Miles	Cents
Rates of Postage, letter of one sheet	30	6
Rates of Postage, letter of one sheet	80	10
Rates of Postage, letter of one sheet	150	12½
Rates of Postage, letter of one sheet	400	18½
Any greater distance		25

Double letter, the double of these rates.
Triple letter, the triple.

"The yearly transportation of the mail in stages amounts to 2,411,760 miles; ditto in sulkies and on horseback, 3,180,892 miles. Total, 5,592,652 miles. Averaging one office to fifteen miles and a half of post roads."

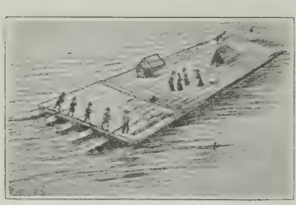
The accompanying cut of an American Stage Wagon is from an engraving in Mr. Mackenzie's rare and intensely interesting "View of the United States of America" slightly over a century ago.

The Era of Waterways

From the date of the earliest history, told in rude drawings on stone, man has utilized water to transport himself and chattels, including for many ages his many wives, children and herds, from place to place. He began by mastering his equilibrium on a floating log. He quickly learned to fasten two logs together with vines. This gave him the first form of a raft, such as boys construct for the navigation of neighboring ponds and creeks to this day.

As soon as man provided himself with a stone hatchet, he conceived the idea of scooping out a hollow log into a canoe. He probably got this idea from seeing the half of a cocoanut shell or gourd or even a clam shell floating in water where it would sink if overturned. Anyhow, from the rudest sort of a savage dugout was evolved every form of boat that floats on lake, ocean or waterway today. It took centuries to convince man that boats could be built of iron or steel as well as wood. But the lesson once demonstrated, the wooden vessel as an ocean carrier has been almost driven on the shores of oblivion.

The story of the great Deluge affords us the first more or less authentic account of the building of the original ocean freighter or tramp. The specifications of that historic sea going menagerie are worthy the study of every child and grown person. It was to be constructed of gopher wood, divided into many rooms to accommodate all manner of living things. It was to be "pitched within and without with pitch," and this is the fashion after which it was to be built; in length 300 cubits, in breadth fifty cubits and in height thirty cubits. As a cubit is the length from a man's elbow to the end of his middle finger, a fair notion of the dimensions of this first marine monster can be had. For easy reckoning, the Hebrew cubit has been accepted as 22 inches, which would indicate that Noah's ark was about 550 feet long, or some 140 feet shorter than the Great Eastern or most of our modern leviathans. The Ark, however, had greater width of beam and depth of hold. Having no machinery, it was therefore of greater carrying capacity than any of our great ocean tramps. The Ark was a three-decker, but was scantily furnished in the matter of windows and doors. Neither was there any artificial ventilation. There was no lack of fresh



EARLY RAFT ON THE MISSISSIPPI

water for lavatory and drinking purposes. The crew and animal attendants had only to "Dip it up."

For the forty-day voyage for which it was designed, the event established its sea going efficiency. As the flood receded, instead of sinking to rest in the soft ooze of some fertile valley near Bagdad, it went ashore on the top of Mount Ararat, some 17,112 feet above sea level, which gives a faint notion of the freshet necessary to destroy every living thing from the face of the earth except those with Noah in the Ark. When the waters subsided, the Ark occupied the highest dry dock in the history of maritime adventure.

Coming down from the days of Noah some two thousand and odd years B. C., there was a slow evolution of water carriage by different types of raft and boats with poles, oars and sails for motor power. Tyre and Sidon, on the sea coast of Palestine, were the ports from which the trade of Western Asia sought an outlet to the cities of Europe on the Mediterranean Sea seven hundred years before Christ.

It is claimed that Phoenician sailors rounded the Cape of Good Hope fully 2,000 years before Vasca di Gama discovered that India could be reached by way of that bold promontory at the extreme south end of Africa. This discovery placed it on the route of one of the great ocean highways of the world. It was to shorten this route to India that the Suez Canal, connecting the Mediterranean and Red Sea, was begun in 1858 and finished in 1869.

The story of the gradual development of transportation by water from galleys, with twenty-two slaves tugging at oars on either side, to the great square-rigged ships that studded every ocean before steam came to take the wind out of their sails, is one of fascinating adventure and romance. The greatest adventure of them all was the one that brought immortal fame to the great Genoese sailor and opened this continent to the freedom-seeking colonists of Europe. What land-bred American has not thrilled with the compelling lines of Joaquin Miller on Columbus, beginning with:

Behind him lay the gray Azores,
  Behind the Gates of Hercules.
Before him not the ghost of shores,
  Before him only shoreless seas.

And ending:

Then pale and worn he paced the deck
  And peered through darkness. Ah, that night
Of all dark nights! And then a speck—
  A light! A light! At last a light!

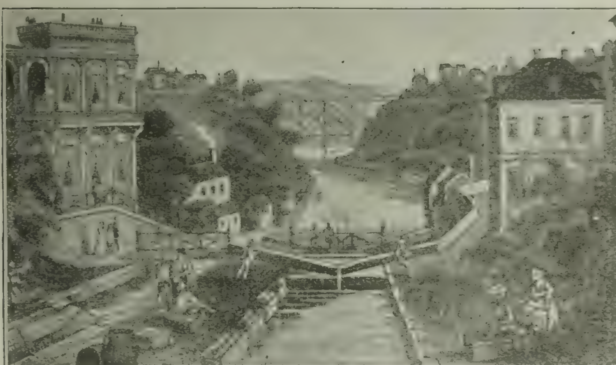
It grew, a starlit flag unfurled!
  It grew to be Time's burst of dawn.
He gained a world; he gave that world
  Its grandest lesson: "On! Sail on!"

It was the voyage in search of another sea route to India that paved the way for the Mayflower and the countless flotillas of sailing vessels that quickly established an ocean highway between Europe and America. Columbus was seventy days making the voyage from Spain to the Bahamas; the Mayflower had a stormy passage of sixty-three days from Plymouth to Cape Cod, and the tiny Half Moon made a round about trip in search of the Northwest passage that took Hudson 151 days from Amsterdam to New York, at the mouth of the river that bears his name to this day.

Artificial Waterways

Thus far we have been considering the development of transportation over the natural waterways of the earth, of which the oceans and the seven seas rank first, followed by the great lakes, estuaries and rivers. But man quickly rebelled against the obstructions that nature interposed between his chosen waterways. So, as early as thirteen centuries before Christ, Sisostris cut canals for transporting merchandise running at right angles with the Nile as far as Memphis to the sea. Various attempts were made by Roman emperors to cut a canal across the isthmus at Corinth. China had a canal nearly 700 miles long from Hang-choo-foo to Yan-kiang river in the 13th century.

In Great Britain the earliest canal was one 36 miles long, 10 feet deep and 66 feet wide, from Leeds to Goole. A canal mania struck the United Kingdom toward the close of the 18th century—the longest being a shallow ditch four feet deep from Leeds to Liverpool, a distance of 127 miles. A projected canal to join Stockton and Darlington was nipped in the bud by the survey and construction of the pioneer railway between those two historic points. Ireland had two canals six feet



LOCK AT LOCKPORT ON THE ERIE CANAL—1826

deep, one from Dublin to the green banks of the Shannon, 89 miles, and the other from Dublin to Cloondara, both of which are wet to this day. The Cloondara canal was dug in such leisurely fashion that it took 33 years to complete it. The canal mania did not extend to the United States until the second decade of the 19th century, although a short canal named the Middlesex, connecting Boston and the Concord river, was constructed in 1804.

The Erie canal, begun in 1817 and opened from Albany to Buffalo, 352 miles, in 1825, was the first and most ambitious attempt to solve the growing transportation needs of the United States by an artificial waterway. Between eight and nine million dollars were spent in its construction, but, though

40 feet wide at the top, it was so shallow—only four feet deep—that it was contemptuously referred to as "the longest and most expensive gutter in the world."

It is interesting to recall that three fast-walking horses could draw a canal boat four miles an hour on its placid bosom, and it is recorded that "at the end of the fourth day from Schenectady the jaded traveler reached Buffalo." Where it had previously cost $5 and taken 30 days to ship 100 lbs. from Philadelphia to Columbus, Ohio, after the Erie Canal was opened the time was reduced to 20 days and the cost to $2.50. During the first seven years after its completion the business of the Erie canal doubled and the rejoicings over its prospects seemed justified. The echo of the steam whistle had not yet been heard reverberating along the banks of the mighty Mohawk. Other canals opened about this time were the:

Oswego—Oswego to Syracuse, N. Y.
Cayuga and Seneca—Geneva to Montezuma, N. Y.
Black River—Rome to Carthage, N. Y.
Champlain—Waterford to Whitehall, N. Y.
Delaware and Hudson—Rondout, N. Y., to Honesdale, Pa. (108 miles).
Morris—Jersey City to Phillipsburg, N. J. (102 miles).
Lehigh—Easton to Coalport, Pa.
Lehigh Delaware Division—Easton to Bristol, Pa.
Pennsylvania—Columbia to Wilkesbarre, Pa. (144 miles).
Pennsylvania West Branch Division (35 miles).
Pennsylvania Juniata Division (14 miles).
Susquehanna & Tidewater—Susquehanna, Pa., to Havre de Grace, Md.
Chesapeake & Ohio—Georgetown to Cumberland, Md. (184 miles).
Dismal Swamp—Elizabeth river to Pasquotonk, N. C.
Ohio—Cleveland to Portsmouth, O. (308 miles).
Ohio Hocking Branch.
Ohio Walholding Branch.
Miami & Erie—Cincinnati to Toledo, O. (264 miles).
Illinois & Michigan—Chicago to Illinois river (97 miles).

All these canals were projected, built and opened between the years 1817 and 1849, except the Dismal Swamp, which was begun in 1787 and opened in 1794, a remarkably quick job, as canal digging went in those days. The purpose of this canal was not to drain the Swamp, but to allow small

schooners with a draft of less than five feet to pass from Chesapeake bay to Albemarle sound.

It is worthy of notice that, with one exception, all these early canal ventures were in the eastern section of the original territory of the United States.

The life of the average canal mule was said to be the same as that of a modern freight car, twenty-five years. He was held to be serviceable as long as he had a good pair of heels.

The Middlesex, of which mention has been made, was really the first canal in the United States designed to facilitate general passenger and freight business. It was 31 miles long, 24 feet wide and 4 feet deep. A packet boat plied regularly between Boston and Lowell, taking nearly a day for the journey. The first boat voyage to Concord, N. H., was made in 1819. This embryo canal, having served its purpose well, was disused in 1851.

Throughout his life George Washington was an ardent believer in canals to connect the great American waterways. He was especially interested in the project of a canal to link up Georgetown on the Potomac to Cumberland at the base of the Alleghenies. Something like $15,000,000, first and last, was expended on this one enterprise. Among other early canal projects favored by Washington were the Potomac & Ohio, the James & Ohio and the Mohawk & Great Lakes connections—all, it will be perceived, designed to carry out his heart's dream of tightening the bonds between the coast cities and the great plains of the West.

The birch canoe of the American Indian is the most buoyant and tottlish mode of water transport known to man. In shape it is a thing of beauty, and with a light load of two persons seems to ride upon the surface of the water, and yet it is so constructed, wide and flat in the center, tapering to both ends, that it will carry extraordinarily heavy loads. Although both ends are exactly alike, through the perversity of inanimate things the steersman by choice invariably takes the same end. The typical Indian canoe has no seats—just bars—the center bar being used to lift and carry the inverted canoe by a single person.

The toboggan, with teams of dogs or hauled by the proud brave or patient squaw, was the typical winter means of transport of the American Indians. The snowshoe served to carry the hunter, but little else when the snow was deep and heavy.

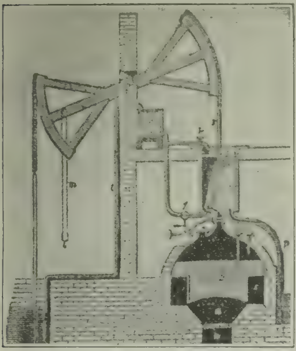
When the white man began to supplant the Indian along the magnificent water stretches of America, he quickly substituted poles, oars and sails for paddles; and batteaux, skiffs, flatboats and keel boats for canoes, as means of water transport. With the current, there was no limit to the loads they could carry any distance so long as time was not to be considered. What if it did take 90 days from Pittsburgh to New Orleans, it was a deliberate age and there was always adventure along the way. Before the river steamer came to disturb the serenity of the scenery, passengers and crew had plenty of time to reflect on how they were to get back. Until the steamer came it was cheaper to sell the barges than to push, pole or row them against the relentless currents.

In considering the pre-steamer condition of transportation in America it is well to remember the difference in the freight charge between descending and ascending navigation. In 1814 it was stated "the freight on a barrel of produce or merchandise from Louisville to New Orleans, a distance of 1,545 miles, was $1.50, but to come up from New Orleans to Louisville it was $4.50 a hundred weight, or $9 a barrel. The latter figure is at the rate of 5.8 cents per ton mile where the former is about 1 cent per ton mile. The up river rate could be paid only by expensive merchandise. The rivers or natural waterways of this continent before the coming of steam were practically "one-way" highways for the transport of the traffic that within a century was to exceed that of all the rest of the world.

The Coming of Steam Power

But across the water which the fastest sailing vessel ever built took nearly two weeks to cross, the inventive genius of man was experimenting with the expansive power guaranteed through the combination of fire and water. For generations and centuries man had watched the struggle of boiling water to escape confinement in any kind of a pot or kettle. What

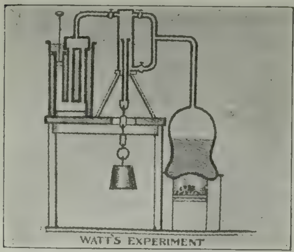
boy has not heard the spirit of steam singing and puffing in the kettle on the hearth or, more likely, the kitchen stove? The power of steam to impart motion was known to the ancients, but its application was scarcely thought of until some time about the end of the 17th century. In 1705 a blacksmith of Dartmouth, England, patented a contrivance which worked by steam to pump water from mines.



NEWCOMEN'S ENGINE—1705
This invention used the "beam" for the first time in pumping engines and held its own until Watt started his additions, betterments and improvements, twenty odd years later.

In 1776, when the United States of America took its place among the progressive nations of the earth, the world was still waiting for the coming of steam as the motive power that was to make man independent of the primitive means of transport that had made little progress "since the days beyond the flood." The railway waited on the coming of steam to emancipate man and merchandise from the tyranny of time, wind and tide. Knowing the power of steam, it is one of the mysteries of the ages how centuries went by before man made any practical use of that knowledge to harness it to do his will.

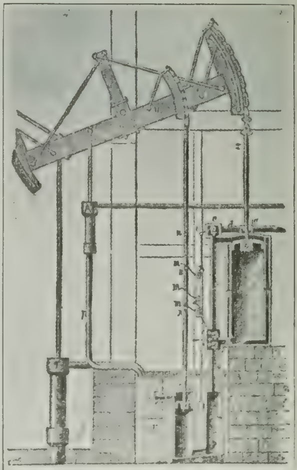
But toward the close of the 18th century it appears that the time was ripe for the utilization of steam. Scores of individuals in England and on the continent were busy inventing steam engines. For the most part they were clumsy and inffective machines. Not until Thomas Newcomen employed a steam cylinder and piston rod acting on a working beam, the opposite end of which operated a pump, was the first steam engine, properly so named, constructed. Newcomen took out a patent on his invention without moving parts in 1705 and in 1723 set up an engine for drawing water.



MODEL OF WATT'S EARLIEST STEAM ENGINE—1769

In 1729 he died without having made any practical progress with his epoch-making discovery.

James Watt, who was to take Newcomen's device and develop it into the greatest force of modern civilization, was not born until 1736. He was a mathematical instrument maker at the University of Glasgow when he was called on to repair a model of one of Newcomen's machines. Out of that chance meeting of the man and the opportunity came the improvements that in 1774 resulted in the modern "reciprocating" engine. Watt designed one addition and alteration after another, so quickly that nothing was left of the original Newcomen engine but the bare idea. He applied the principle of keeping the cylinder, if possible, as hot as the steam that enters it, the steam jacket air pump, and "separate condenser"; the double acting engine with steam admitted at both ends of the cylinder, producing the push and pull on the piston rod; the rigid connection between the piston and the crank shaft, the fly wheel—in fact all the attachments that were to adapt the steam engine to multifarious uses of mills, locomotives, steamships and factories. Watt also obtained



WATT'S SUCCESSFUL STEAM ENGINE—1774

Note the resemblance to and departure from Newcomen's engine

a patent for a rotary steam engine. He made experiments with locomotives, but their successful construction was left for the genius of Richard Trevithick, who perfected a high-pressure steam engine—the principle which Watt disapproved—and finally put the first practical locomotive with flange wheels on iron rails. While earlier inventors were perfecting separate features of the steam engine, Watt's was the genius that was to assemble what had been invented into the practical machine which, yoked up first with boats and ships and then with cars on rails was to revolutionize the transportation of the world.

So the power that was to provide carriage for man and his belongings with speed and strength beyond the most extravagant dreams of the 18th century was born. Once mastered, the force of steam was applied with amazing energy and success. How the contagion of invention spread may be condensed from the record:

FULTON'S SKETCH OF THE "CLERMONT"

Steam carriage for roads built in France in 1769.

Jonathan Hornblower patented an engine with two cylinders in 1781.

Watt invented a double acting engine in 1782.

Phineas Crowther built an engine with a fly-wheel above the piston and no beam in 1800.

America entered the lists in the same year, when Oliver Evans introduced the high pressure engine.

The Reverend Edward Cartwright took out a patent for a portable engine in England in 1801. Here we are getting down to the days that presaged the coming of the modern locomotive.

In 1802 Trevithick and Vivian of England patented a high pressure engine. Mark that name, Trevithick, as one inseparable from the early history of the locomotives, preceding that of Stephenson in point of time, but not in the fame that attaches to demonstrated success.

The first practical steamboat, the tug *Charlotte Dundas,* was built by William Symington and tried on the Forth and Clyde Canal in March, 1802.

Robert Fulton, with the assistance of Chancellor Livingston, United States ambassador to France, built a steam paddle boat 60 feet long which was tried on the Seine August 9, 1803.

First railway locomotive built by Trevithick in 1804.

Then George Stephenson took the center of the transportation stage with "The Rocket" in the ever-memorable year in railway annals, 1829.

With the entrance of Stephenson, the era of experiment gave place to that of demonstration.

ROBERT FULTON—1765-1815
Father of Steamboat Navigation in the United States
From a painting by himself.

The Rival Inventors

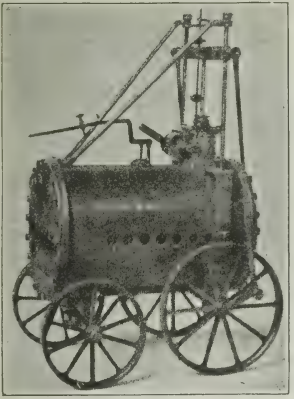
No story of the begining of the railway era can omit a passing tribute to Richard Trevithick and George Stephenson. It is possible that other men who were their contemporaries might have had as sound ideas of the application of steam to locomotion as these two; there is a replica of a model of a road locomotive in the South Kensington Museum said to have been built by William Murdock in 1784, but none of the previous inventors had the good fortune to link their ideas to the practical device that was to rob distance of its terrors and bring the uttermost parts of five continents into comparatively easy communication.

Trevithick was the son of a Cornish mining engineer, born at Illogan in April, 1771, when the whole engineering world was experimenting with its new found power. Succeeding to his father's profession, his first invention was naturally an improved steam pump which came into universal use in deep mine pumping. He next perfected a high pressure engine and began experimenting in locomotive engines. Passengers were first conveyed by steam by his road locomotives in 1801 and he was not long in successfully working out a steam road locomotive. In fact, Trevithick first adopted the rails upon

which Stephenson developed his inventions that were to revolutionize transportation. He was one of the first to recognize the value of iron in shipbuilding, and in many ways demonstrated the possession of true inventive genius. But Trevithick was of a roving nature and profited little from his numerous inventions, dying, as so many inventors do, poor. But his fame is secure.

RICHARD TREVITHICK—1771-1833
Inventor of the first locomotive

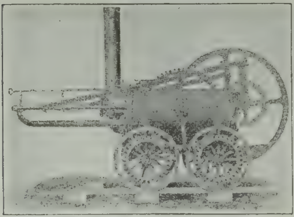
George Stephenson was born to a different fate. Fortune smiled upon him from his birth, near Newcastle, June 9, 1781. The ten years that separated him from Trevithick gave him the tremendous advantage of coming upon the stage when the experiments that ushered in the 19th century were ripening into practical results. Instead of being born with a silver spoon in his mouth, Stephenson was born to an opportunity such as can never again play Fortunatus to a young and aspiring man. He had his apprenticeship as assistant fireman and brakeman in a colliery, and was made engineman before he was twenty-one. In 1808 he took a contract to operate engines, and by 1812 was constructing them.



TREVITHICK'S MODEL LOCOMOTIVE

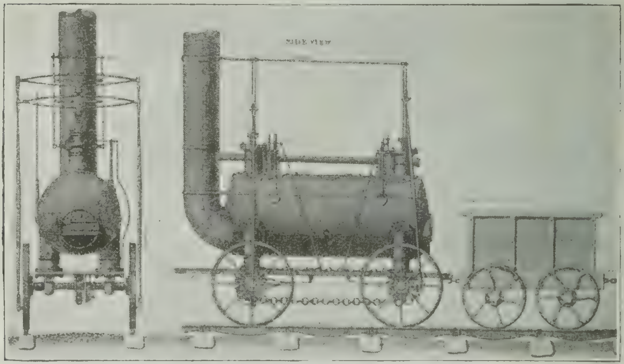
During this time Stephenson was a close student of the progress that was being made

to apply steam power to locomotives, and devoted all his spare hours to working out the principle in a practical way. He was fortunate in obtaining the financial assistance that enabled him to construct a locomotive which was run on the colliery tramway on July 25, 1814, and drew eight wagons at the rate of four miles an hour. In passing, this may be compared with the giant locomotive of today drawing a train of 100 cars, each capable of stowing away the eight wagons of Stephenson's successful invention.



TREVITHICK'S GATESHEAD MODEL—1804

Stephenson next invented, or rather adapted, the "steam blast" that enabled him to double the speed of his locomotive, and the patents he took out in 1815 continue the base for the construction of locomotives to this day. He was appointed resident engineer of the Stockton & Darlington line and persuaded its directors



STEPHENSON'S PATENT LOCOMOTIVE
From Strickland's Report on Canals and Rail Roads, 1826.

to substitute steam for horses in its opening on September 27, 1825.

The Stockton & Darlington Railway Act of April 17, 1821, merely provided for the hauling of wagons and other carriages upon the line "with men or horses or otherwise." That "otherwise" opened the door through which George Stephenson persuaded the company to drive the first train of cars hauled by a steam locomotive in the history of rail transportation. On September 26, 1825, the trial trip was made with a train consisting of the locomotive "Locomotion" and one coach, with George Stephenson in the coach and his elder brother James driving the engine. On the next day the formal opening took place with as heterogeneous a train as ever took part in one of the greatest events in railway history. It consisted of the following:

The "Locomotion," driven by George Stephenson.
Tender with water and coals.
Six wagons, loaded with coals, passengers on top of them.
One wagon loaded with sacks of flour, passengers among them.
One wagon containing the surveyors and engineers.
Coach occupied by the directors and proprietors.
Six wagons filled with strangers.
Fourteen wagons packed with workmen and others.

The weight of this train was estimated at eighty to ninety tons, and, deducting time for delays and two accidents, an average speed of eight miles an hour was attained. The legend records that the coals were distributed among the poor of the neighborhood and the workmen were regaled with victuals and ale.

The accompanying halftone (p. 25) of "Locomotion," as locomotive No. 1 on the Stockton & Darlington Railway was named is from a photograph taken in 1875 of the engine as reconstructed. It was built in 1825 by Robert Stephenson & Company, and a comparison with the original drawings shows that it preserves the original form and general appearance, although the wheels are of later pattern. The same engine

GEORGE STEPHENSON'S "ROCKET" —EARLY MODEL

is shown on a preceding page in contrast with a modern English locomotive of 1924.

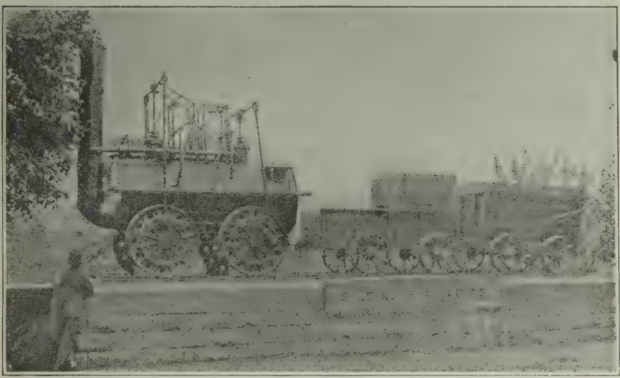
This event, however, was quickly overshadowed by the most far-reaching success of Stephenson's career. He was employed in the construction of the Liverpool & Manchester Railway, which in itself was a great engineering feat across a swamp district known as Chat Moss. Here again he persuaded his directors to give his newly constructed engine a chance. They accordingly offered a prize of £500 for a locomotive to run ten miles an hour, drawing three times its weight. The trial came off on October 26, 1829, and was won by Stephenson's ever-famous "Rocket."

STEPHENSON'S "PLANET", 1830
The real prototype of early American locomotives. Note the resemblance in succeeding cuts.

The boiler of this famous locomotive was cylindrical, 40 inches broad and 72 inches long; the cylinders, placed at an angle of 37 degrees, were 8 inches by 17 inches. There were 25 copper tubes 3 inches in diameter, with a heating surface of 138 square feet. The "Rocket" had a grate area of 6 square feet. The diameter of the driving wheels was 56½ inches. In working order it weighed 4 tons, 5 cwt., the tender 3 tons, 4 cwt. In the trial competition the tender was taken as part of the load. It attained a speed of 29½ miles an hour.

The award of the prize to the "Rocket" in the Rainhill trials of October 26, 1829, was not received without much adverse comment on the conduct of the judges in changing the conditions during their progress. Before these changes "The Novelty," entered by Messrs. Braithwaite & Ericsson

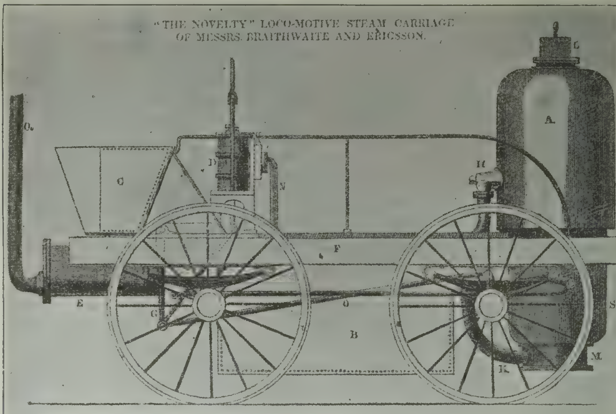
of London, had demonstrated its superior speed by making "one mile in the incredibly short space of 1 minute and 53 seconds," according to a contemporary observer. On the second day it drew a load three times its own weight at "the rate of 20¾ miles an hour," consuming its own smoke, coke being the fuel used, but was unable to complete the trial



LOCOMOTIVE NO. 1, BUILT FOR THE STOCKTON & DARLINGTON RAILWAY BY ROBERT STEPHENSON & CO. IN 1825
Though rebuilt more than once, it preserves its original form, only the wheels being of a different pattern

because of rain "which clogged the railways with mud." In a subsequent trial one of the feed pipes burst and the temporary repair was "too green" to stand the necessary steam pressure. "The Novelty" weighed only 2 tons 15 cwt., or slightly more than half Stephenson's "Rocket." American youth will be interested to know that the junior member of the firm of Braithwaite & Ericsson was no other than John Ericsson, who came to the United States in 1839, in time to build the first Monitor, in 1861, and to revolutionize the construction of warships.

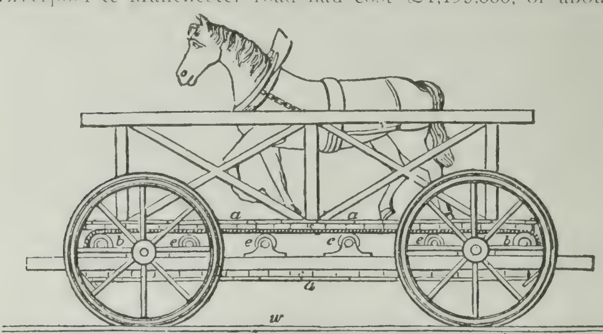
A real novelty entered in the Rainhill trials was Brandreth's horse engine called "Cyclopede," weighing 3 tons.



"THE NOVELTY"—BRAITHWAITE & ERICSSON, RIVAL OF STEPHENSON'S "ROCKET"

The Rainhill award of October 26, 1829, may be said to have ended the experimental stage of the locomotive.

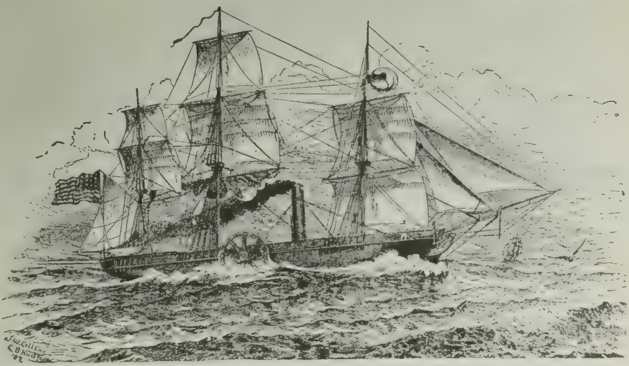
In the cost of railway construction the British pioneers set a pace which has kept them in the lead ever since. Up to the end of 1835, five years after it was opened, the little Liverpool & Manchester road had cost £1,195,000, or about



BRANDETH'S PATENT HORSE POWER ENGINE—1829

$187,495 per mile. Much of this was due to the excessive cost of the right of way. The value of railway lands in England in 1887 was placed at $1,615 per acre. At such a valuation the right of way of American railways in 1924 would be something over $5,500,000,000!

The "Planet," built by Robert Stephenson & Co. in 1830, was destined to be the type for a long line of practical engines



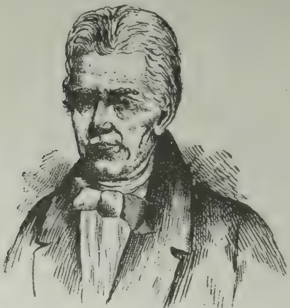
THE "SAVANNAH"
First steamship to cross the Atlantic. From drawing by C. B. Hudson under direction of Captain J. W. Collins of United States Commission of Fish and Fisheries in 1889.

and from the illustration is seen to be a great advance upon its predecessors of the "Locomotion" type.

The Coming of Steam to America

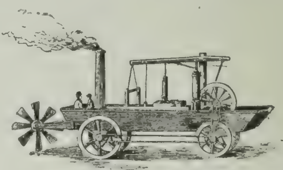
It is now in order to cross the Atlantic and see how the new force in mechanics fared in our land of sparse settlements and magnificent distances. Singularly enough, the first steamship to cross the ocean sailed from Savannah. She was named after the city from which she cleared, although built in New York. The "Savannah" sailed on May 20, 1819, and her log records that she sighted Cork, Ireland, on June 18 following. She was a hybrid, for sail and steam, 99 feet long, with a 26-foot beam, and registered 350 tons. Her paddle wheels were arranged with a series of joints, so that they

could be easily detached and hoisted on board, in case of storm. They could be shipped and unshipped in 20 minutes. When the "Savannah" reached the English Channel, she was mistaken for a ship on fire, and a revenue cutter that went to her assistance reported that "this strange ship went faster with bare poles than we could do with all sails set."


OLIVER EVANS—1735-1819
Inventor of first high pressure engine.

The "Savannah" had 32 staterooms, but a wholesome terror of the two-fold perils of sea and steam kept them unoccupied on her maiden voyage. The nautical feat was merely significant of the avidity with which American ingenuity seized upon the invention of Watt to improve transportation conditions in the new world.

Oliver Evans, who was credited with the invention of the high pressure engine in 1800, came to the front with one of the curiosities of steam locomotion. It was nothing less ambitious than an amphibious locomotive. It was provided with four wheels, upon which it traveled by land, and with a paddle wheel in the rear for propulsion when it reached its native element. Evans also constructed the first steam dredge, consisting of a flat scow equipped with a small engine to work the machinery for raising the mud. This dredge was also fitted with wheels on which it propelled itself to the Schuylkill river, near which it was built.

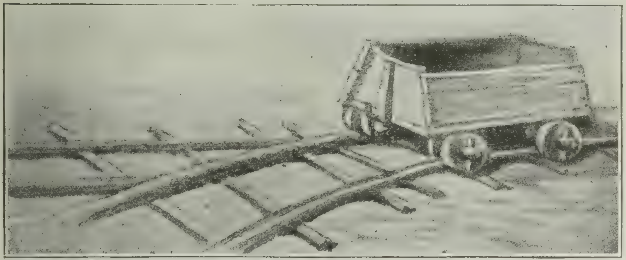

OLIVER EVANS' ERUCTOR AMPHIBOLIS, 1804, ON LAND

In 1780 Evans built a multitubular boiler in which the water was in the tubes, where in the modern boiler the heat is in the tubes and the water surrounds them. Evans was a

typical Yankee inventor and was able to turn his ingenuity to almost any mechanical contrivance that came under his observation.

FIRST PASSENGER COACH, QUINCY RAILROAD

The coming of the first American railway is generally traced to the construction of a tram road in 1826 from Quincy to Charleston, Massachusetts, to carry stone for the Bunker



PRIMITIVE WOODEN RAILWAY AND CAR WITH DOUBLE FLANGES
The artist failed to complete the switch

Hill monument. It was purely a quarry road, operated by gravity and horse power. The horses pulled the cars up hill and rode down. Another gravity road frequently mentioned in the early chronicles of American railways was that built at

Mauch Chunk, Pennsylvania, in 1827, to convey coal from the mine at Summit down to the Lehigh river. Still another tramway of these pre-railway days was that from Carbondale to Honesdale, some sixteen miles. It was on this last mentioned road that the "Stourbridge Lion," the first locomotive used in the United States, imported from England, had its trial trip. Although it weighed only seven tons, it was found too heavy for the primitive tracks of those days.

FREIGHT TRAIN ON THE QUINCY LINE—THE FIRST RAILWAY IN AMERICA.

These pioneer experiments, however, have to concede primacy to the tramway built in Ridley township, Delaware county, Pennsylvania, in 1806 by Thomas Leiper for the transportation of stone from his quarries on Crum Creek to his landing on Ridley Creek, a distance of about one mile. It is thus described in Dr. George Smith's history of Delaware county, compiled in 1862:

"The ascents were graded inclined planes, and the superstructure was made of white oak with cross ties and string pieces. The cars or trucks were very similar to those now in use, the wheels being made of cast iron with flanges. The line of the road can still be seen. This railroad was superseded by the Leiper Canal, which passed from the upper quarries down Crum Creek to the landing, in 1828, and it was used until 1852, when it in turn was superseded by the present railroad."

BANK OF THE DELAWARE & HUDSON CANAL COMPANY AT 13 WALL STREET, NEW YORK IN 1825.

Although the first locomotive of whose trial on American rails we have any record, the "Stourbridge Lion" was not the first locomotive to reach these shores, as the following notes furnished the writer by President Loree of the Delaware & Hudson Company

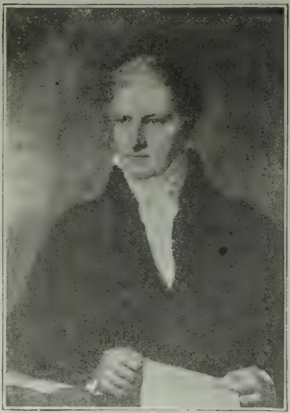
(originally the Delaware & Hudson Canal Company), which built the 16-mile line from Honesdale to Carbondale, testify:

"This company sent its agent, Mr. Horatio Allen, to England in January, 1828, to secure locomotives to work on its gravity railroad from Carbondale to Honesdale, between the inclined planes, of which there were eight. One locomotive,

GENERAL OFFICES—DELAWARE & HUDSON CANAL CO. IN ALBANY ABOUT 1870

the 'America,' was bought of Stephenson & Company of Newcastle, and arrived in New York on the steamship 'Columbia' on January 15, 1829. Three locomotives, the 'Stourbridge Lion,' the 'Delaware' and the 'Hudson' were bought of Foster, Rastrick & Company of Stourbridge, about sixteen miles from Birmingham, England. The 'Stourbridge Lion' arrived in New York on May 13, 1829." The two others arrived in August and September, 1829, but what became of them is not recorded.

"Both the 'America' and the 'Stourbridge Lion'," continues Mr. Loree, "were shipped by sloop to Rondout and there unloaded. We have a record of the shipment of the 'America



PHILIP HONE, 1781-1851
First President, Delaware & Hudson Canal Co.

on the Delaware & Hudson Canal, but no further trace of it, except that one of its cylinders is now in the Smithsonian Institution at Washington, D. C.

Apparently the trial trip of the "Stourbridge Lion" on August 8, 1829, was its last, because the strap rails were too slight to carry its seven tons, where Allen had contracted for only three. Allen demonstrated his courage if not his discretion by running the "Lion" across "the trembling trestle" at the rate of "ten miles an hour amid deaf-

GENERAL OFFICES OF THE DELAWARE & HUDSON COMPANY IN ALBANY IN 1924
Note the word "Canal" was dropped from the title in 1899 by act of the legislature

ening cheers," but none of the cheering multitude accepted his invitation to become immortal by accompanying him.

To the "Stourbridge Lion" belongs the honor of having been the first steam locomotive to run on any American railway. The cost of these two forerunners of the sixty-odd thousand American locomotives of today, as furnished by Mr. Loree, was as follows:

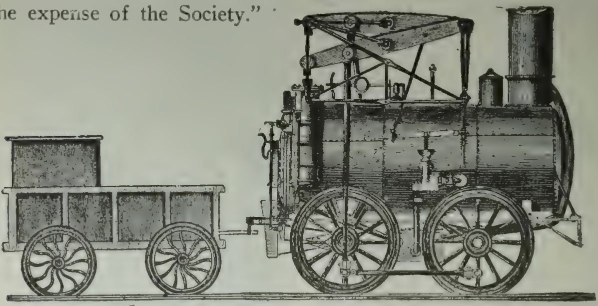
	"America"	"Lion"
Engine	$2,581.00	$2,190.63
Insurance	95.79	26.79
Freight	230.08	93.33
Customs	709.65	604.15
Commission 1 per cent......	27.90	......
Expense unloading	18.88	......
	$3,663.30	$2,914.90

The commission on the purchase of the "Lion" was included in the price. The grand total bill for the four locomotives bought by the Delaware & Hudson Company was $12,515.58, or about one-fifth the cost of an up-to-date modern locomotive.

HORATIO ALLEN
Engineer sent by the Delaware & Hudson Company to England in 1828

Early in 1825 the "Pennsylvania Society for the Promotion of Internal Improvements in the Commonwealth" sent William Strickland, engineer, to Europe to collect information relating to the construction of canals, roads, railways, bridges, steam engines and various industrial arts. Its instructions excluded principles and theories and called for definite plans, drawings, specifications and estimates of cost. His first inquiries were to be directed to railways. And his instructions ended with the injunction, "Locomotive machinery will command your attention and inquiry. This is entirely unknown in the United States and we authorize you

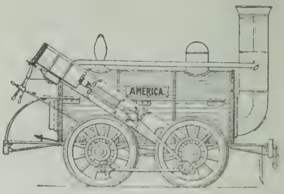
to procure a model of the most approved locomotive machine at the expense of the Society."



THE STOURBRIDGE LION
First English locomotive on Delaware & Hudson track
(From a drawing.)

The First Railroad in the United States

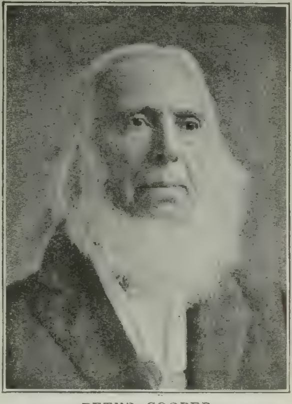
We have now arrived at the time when track and power were to be combined to give America its first railways. To the Baltimore & Ohio belongs the honor of that historic conjunction of the elements that were to link the distant states in the Union that was to prove indissoluble. At the ceremony for breaking ground for this road on July 4, 1828, Charles Carroll, of Carrollton, then in his 92d year, said: "I consider this among the most important acts of my life; second only to that of signing the Declaration of Independence, if even second to that." He lived to see it completed to the Point of Rocks, 73 miles from Baltimore.



MODEL OF FIRST ENGLISH LOCOMOTIVE IMPORTED IN 1829.

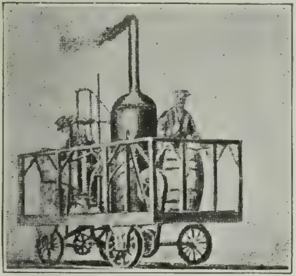
Originally operated as a horse railroad, the Baltimore & Ohio was the scene of the celebrated contest between a horse drawn car and the experimental locomotive "Tom Thumb" built by Peter Cooper. Unfortunately for the engine, the belt that worked Mr. Cooper's contrivance for blowing the fire slipped off the drum at a critical stage of the race and before

it could be adjusted the old gray horse of the story came in an easy winner. But even so, in this contest the iron horse demonstrated its superiority, barring accidents, over the fleet animal that for ages had been the recognized symbol of speed and power. The Baltimore & Ohio road was opened for traffic for 14 miles in 1830, the same year that Abraham Lincoln left his mother's cabin to shift for himself.



PETER COOPER

To Colonel Stevens of Hoboken is due the high honor of being the first conspicuous American to urge persistently the construction of locomotives on railways for long distance transportation on this continent. No successive disappointments daunted or discouraged him. He built and ran a steamboat nine years before Fulton built the "Clermont," and also patented a multitubular boiler as early as 1803. Stevens built and operated the first engine that ever ran on wooden tracks in the United States.



PETER COOPER'S "TOM THUMB"
The first locomotive built by an American

As early as 1811, Colonel Stevens had applied to the New Jersey legislature for a railroad charter. Failing in this, he tried to persuade the Erie canal commissioners, just appointed in New York, to build a railway instead of a canal across the state from Albany to Buffalo. But they were wedded to the waterway

project, so once more the persistent colonel turned to the legislature of his own state, which this time, in 1815, granted him a charter, the first of its kind in the New World,

THE RACE BETWEEN A HORSE AND PETER COOPER'S TOM THUMB IN 1830.

to build a railroad to join the Delaware and Raritan rivers, connecting at either end with steamboat lines for Philadelphia and New York. His road did not materialize for the same reason that held similar schemes in leash—lack of confidence, credit and, more to the point, lack of cash. Investors were still shy of putting good money into an enterprise where the investment was certain and irrevocable but the returns were at least problematical. In those days the necessary funds had to be secured by selling securities at a discount that would be considered prohibitive today.

COL. JOHN STEVENS—1749-1838
Obtained first charter to build an American railway in 1815

Colonel Stevens next directed his attention to Philadelphia, where, through the aid of some of its business men, in 1823 he secured a charter to build a railroad from Philadelphia to Columbia, a town on the Susquehanna twenty-seven miles south of Harrisburg. This charter contained several clauses of interest to this day. It was to be in force only ten years, the rails were to cross all pikes and roads on causeways and the company might charge seven cents a ton

per mile on freight moving westward and half that sum on freight bound east, an evident concession to the difference in grade. The State of Pennsylvania subsequently repealed this charter and itself assumed the burden of building a railroad through Lancaster to Columbia.

In all the histories of those stirring times there is a plentiful lack of reliable data as to the cost of railway construction. The Quincy tramway is said to have cost "about $34,000," or "about" $8,500 per mile. The powerful 7-ton locomotive, the "Stourbridge Lion," built in England, already mentioned, was entered at the Custom House as having cost $4,869.59, "including freight duties and insurance ($2,914.90, according to Mr. Loree, supra), and Peter Cooper's "Tom Thumb" was said to have cost about $2,000 to build.

SAILING CAR, TESTED ON THE SOUTH CAROLINA RAILROAD 1829-'30
From Brown's History

A few things about those primitive railroads are of interest. Colonel Stevens had to lay a circular track to demonstrate that a locomotive could haul a train around curves; the first rails were long wooden stringers protected on the top from the wear of the wheels by strap iron nailed on, and the locomotives, weighing only a few tons, gave more promise of speed than of tractive power. Engineers still doubted the adhesion of a smooth wheel on a smooth rail, which Trevithick had demonstrated twenty years before. The longest road actually under construction in 1830 was 135 miles, from Charleston to Hamburg, South Carolina.

The common country highway of those days cost from $300 to $500 per mile to build, and it was estimated that it cost 25 cents to move a ton a mile on its normal surface. As

the cost of these early turnpikes rose to $3,000 and $5,000, the cost of moving a ton was reduced to 20 cents a mile—from which cost it had not varied much until the motor truck on hard-surfaced highways, costing from $30,000 to $50,000 per mile, reduced the rate.

The First State Railway

When the State of Pennsylvania took the construction of the Philadelphia & Columbia Railway off the hands of Colonel Stevens' company, the line was finally located in 1828 and construction began in 1829. This was the first railway work undertaken by a State government. About twenty miles at the eastern end of the road was opened for travel in 1832 and the entire line, 81 miles, with two tracks, was completed by 1834. Unlike the railways of today, the State owned only the track and rented its use for both passenger and freight cars to individuals or companies who furnished horses or mules to haul them, paying the State toll for the use of the track. At first the State owned two locomotives, for the use of which a regular toll was charged.

As originally built the Philadelphia & Columbia railway had two inclined planes. At about two miles from its commencement it crossed the Schuylkill by a viaduct 984 feet long and immediately ascended an inclined plane 2,805 feet long and 187 feet high. Another inclined plane 1,800 feet long and 90 feet high descended to meet the canal basin at Columbia. The inclines operated by stationary engines at the head of the planes were never satisfactory, being slow and expensive in operation, and they were scarcely finished before steps were taken to avoid them. They were abandoned in 1840, and a new line built at the east end from Ardmore to West Philadelphia.

State of the Union in 1830

The year 1830 marks the true beginning of the railway era in the United States and it becomes of interest to consider the state of the Union in that period when the inventive genius of mankind was turned to the problem of putting

wheels, tracks and power under the civilization of the world. For a comprehensive description of the vast territory that awaited the "snort of the iron horse" to awaken it from the semi-paralysis of great distances, that by Henry Adams in his "American History During the First Administration of Thomas Jefferson" leaves little to be said:

"According to the census of 1800," says Mr. Adams, "the United States of America contained 5,308,483 persons—one-fifth of them negro slaves.

"Even after two centuries of struggle, the land was still untamed.

"The center of population rested within eighteen miles of Baltimore.

"Except in political arrangement, the interior was little more civilized than in 1750 and was not much easier to penetrate than when La Salle and Hennepin found their way to the Mississippi, more than a century before.

"A great exception broke this rule. Two wagon roads crossed the Allegheny Mountains in Pennsylvania, while a third passed through Virginia southwestward to the Holston river and Knoxville in Tennessee.

"Nowhere did eastern settlements touch the western. At least one hundred miles of mountainous country held the two regions everywhere apart. The shore of Lake Erie, where alone contact seemed easy, was still unsettled.

"The same bad roads and difficult rivers, connecting the same small towns, stretched into the same forests in 1800 as when the armies of Braddock and Amherst pierced the western and northern wilderness.

"Even by water, along the seaboard, communication was as slow and almost as irregular as in colonial days. The voyage to Europe was comparatively more comfortable and more regular than the voyage from New York to Albany.

"If America was to be developed along the lines of water communication alone by such means as were known to Europe, Nature had decided that the experiment of a single republican government must meet with extreme difficulties. By water, an Erie canal was already foreseen; by land, cen-

turies of labor could alone conquer those obstacles which Nature permitted to be overcome. Highways furnished no sure measure of progress. No matter how good the road, it could not compete with water, nor could heavy freights in great quantities be hauled long distances without extravagant cost.

"At any known rate of travel Nashville could not be reached in less than a fortnight or three weeks from Philadelphia.

"Politically each group of states lived a life apart.

"In the Northern states four miles an hour was the average speed between Bangor and Baltimore. Beyond the Potomac the roads became steadily worse, until south of Petersburg even the mails were carried on horseback.

"Of eight rivers between Monticello and Washington, Jefferson wrote, 'five have neither bridges nor boats.'

"The usual charge (for passengers) in the Northern states was *six cents a mile* by stage.

"The Saxon farmer of the eighth century enjoyed most of the comforts known to Saxon farmers of the eighteenth.

"Fifty or a hundred miles inland more than half the homes were log cabins, which might or might not enjoy the luxury of a glass window. (Abraham Lincoln was born in such a cabin in 1809 without 'the luxury of a glass window.')

"As a rule American capital was absorbed in shipping or agriculture, whence it could not suddenly be withdrawn. No stock exchange existed and no broker exclusively engaged in stock jobbing, for there were few stocks.

"A probable valuation of the whole United States in 1800 was $1,800,000,000, equal to $328 for each human being, including slaves; or $418 to each free white.

"Taxes amounted to little or nothing, and wages averaged about a dollar a day."

The picture thus painted of the United States in 1800 was destined to remain so until "Tom Thumbs," "Puffing Billies" and "Best Friends," as the five or six-ton locomotives of the late twenties were called, undertook the giant task of rolling back the American landscape like a scroll.

In his *"Democracy in America,"* published as late as 1834, De Tocqueville, the French philosopher, spoke of the Mississippi valley as the most magnificent dwelling place prepared by God for man's abode and "yet at present it is but a mighty desert."

SIX-HORSE CONESTOGA WAGON—THE FORERUNNER OF THE "PRAIRIE SCHOONER"

The Louisiana Purchase in 1803 extended our boundaries into the wilderness far beyond the Mississippi, only to make the demand for transportation greater than ever.

Before the Railways Came

By way of comparison it may be recalled that at the opening of the nineteenth century the cost of transportation by

AN ARTIST'S VERSION OF THE CONESTOGA WAGON

From a painting by N. H. Trotter.

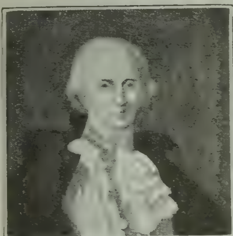
pack horses, the only way, from Philadelphia to Erie, both in Pennsylvania, was stated to be $249 a ton. Then came the dirt roads traveled by the Conestoga wagon, the forerunner of the more famous prairie schooner of the sixties, and the cost dropped to 13.51 cents per ton mile. The mere toll on the early turnpikes was 1.35 cents per ton mile and the trader furnished his own cars or wagons and motive power. The standard rate for moving a ton on canals as late as 1832 was 3 cents a mile. It was from the semi-paralysis of such rates that the railways rescued the American continent.

The third decade of the 19th century dawned upon the Republic with less than 30 miles of railway actually built and operated. According to the census of 1830, this was equal to about one mile of railroad to 428,850 inhabitants, where, according to the latest returns, we now have a mile to about every 420. The contrast shows what the railways have done for this continent in less than a century.

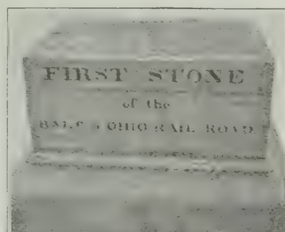
CHAPTER II

THE FIRST DECADE OF AMERICAN RAILWAYS, 1830 to 1840

PHYSICAL difficulties were not the only or chief obstacles in the path of the early railway promoters in America. The canal mania occupied the center of the transportation stage well along through the thirties. Water carriage had the advantage of easy demonstration, and the application of steam to river craft took precedence over land carriage until the smooth-surfaced track came to the aid of the primitive locomotive. What scanty surplus funds had accumulated in America preferred what appeared to be the safer investment, and the money markets of Europe looked askance upon investments in the wilds of the New World; which were still pictured, not without some reason, as the abode of savage and bloodthirsty Indians. In truth the North American Indian was still a menace and obstruction to railway building in the United States down to the days when the Union Pacific was built.



CHARLES CARROLL OF CARROLLTON—1737-1832
Signed the Declaration of Independence Aug. 2, 1776. Turned the first sod of the Baltimore & Ohio Railroad July 4, 1828.



CORNERSTONE OF THE BALTIMORE & OHIO RAILROAD, 1828

The top of the stone marking the spot in Baltimore where the first sod for the Baltimore & Ohio Railroad

PAINTING OF THE FOUNDERS, DIRECTORS AND DISTINGUISHED MEN CONNECTED WITH THE ORGANIZATION AND CONSTRUCTION OF THE BALTIMORE & OHIO RAILROAD.

was turned bears the following inscription, which has come to be of inestimable historic value:

THIS STONE
PRESENTED BY THE STONE CUTTERS OF BALTIMORE

in Commemoration of the Commencement of The Baltimore and Ohio Railroad was here placed on the 4th of July, 1828, by the Grand Lodge of Maryland,

Assisted by Charles Carroll of Carrollton, the last surviving signer of The Declaration of Independence, and under the direction of the President and Directors of the Railroad Company.

In connection with this epoch-marking event the accompanying reproduction of a painting in the Board Room of the Baltimore & Ohio Railroad, furnished by the company, possesses unusual historical interest. For identification, the best known personalities in this picture have been numbered, as follows:

(1) Philip E. Thomas (1776-1861), First President B. & O.
(2) Charles Carroll of Carrollton (1737-1832)
(3) J. V. L. McMahon (1800-1871)
(4) S. F. B. Morse (1791-1872)
(5) Benj. H. Latrobe (1806-1874)
(6) Peter Cooper (1791-1883)
(7) John W. Garrett (1820-1884)
(8) Johns Hopkins (1795-1873)
(9) J. H. B. Latrobe (1830-1891)

By the aid of a strong glass the reader can decipher, on the base of the picture, the names of the other figures in it.

Mr. Garrett, who occupies such a prominent place in this group, came to the presidency of the Baltimore & Ohio in 1858 and is credited with having rescued it from the verge of bankruptcy.

What the Waterways Were Doing

In the meantime large investments in canals made it difficult to raise funds for the primitive railways.

In soliciting bids for locomotives of American manufacture in an advertisement dated January 4, 1831, President Thomas of the B. & O. imposed the following conditions:

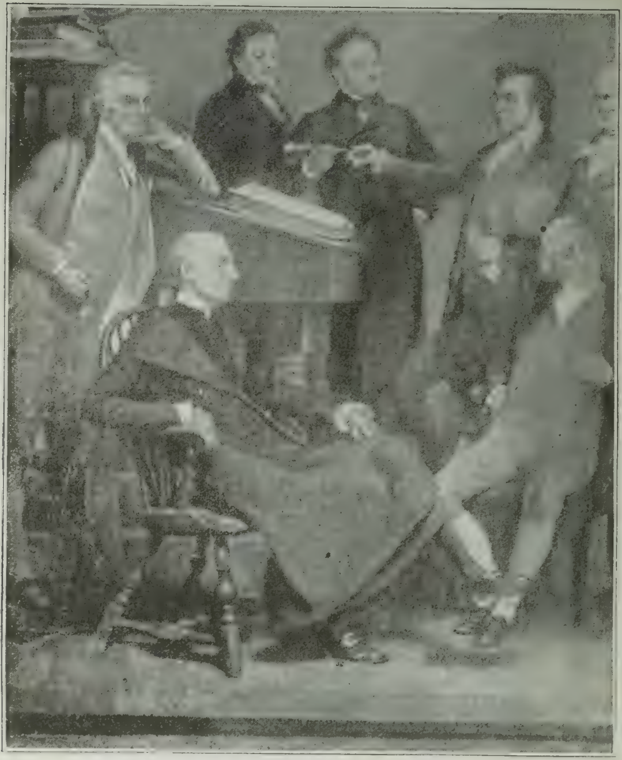
That they should consume their own smoke.

That they should not weigh over 3½ tons.

That they should each be capable of drawing 15 tons on a level road 15 miles an hour.

That the wheel flanges should be on the inside of the rail.

That the steam pressure should not exceed 100 lbs. to the square inch.



CARROLL OF CARROLLTON
Enlarged from B. & O. group

The least radius of curvature of the road was stated to be 400 feet.

"The York," an engine built by Phineas Davis, met the general conditions but was found "too light for advantageous use on ascending grades." It is interesting to compare these conditions with the "Growth of Steam Locomotives" as illustrated in succeeding pages of the history.

Where the first Erie canal cost $20,000 per mile of its four-foot depth and was deepened in 1835 to seven feet at

PACKET BOAT ON THE OLD DELAWARE & HUDSON CANAL
From a copyrighted reproduction by C. Klackuer, N. Y. of original oil painting by E. L. Henry

an added cost of $31,000,000, raising its total to $108,000 per mile, it was well-nigh impossible to raise funds, even at 10 per cent and upwards, to build railways costing from $6,000 to $25,000 per mile without rolling stock or adequate facilities.

It has been officially estimated that a total of 4,468 miles of canal were built in the United States, costing $214,000,000. Of these, up to 1880, some 1,953 miles had been abandoned and the net income of the remaining 2,515 miles did not pay 1 per cent on the cost of construction.

The right of way for canals was later used in many places for railroads, and so the investment in this form of transportation was not entirely lost, except to the original owners, but practically all of the capital put into the early turnpikes was lost, as only parts of some of them were later used for rail transportation.

The standard rate for moving a ton on canals in 1832 was 3 cents a mile. Previous to the opening of the Erie canal it

cost $100 to move a ton from New York to Buffalo, and 20 days was consumed in transit. In northern tiers canals could be operated only seven or eight months.

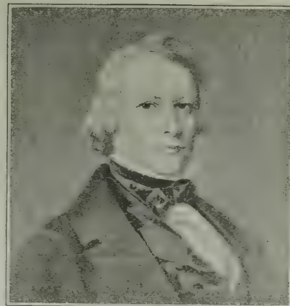
In connection with the charge for carrying freight on canals, it might be added that these rates generally were followed in subsequent charters given to railroads; the Pennsylvania Railroad Company charter stating that its rate should

WHEN TRAVELERS HAD TIME TO PAINT THE LANDSCAPE
Before the age of photographs and railways

not exceed 2 cents per mile for each ton of freight, the rate for passengers being 3 cents per mile for "through" passengers, and 3½ cents per mile for "way" passengers.

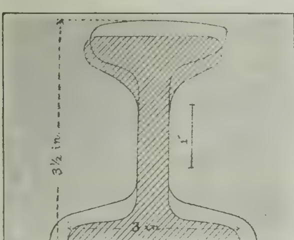
Under such conditions the 61 miles of the Camden & Amboy were projected in 1830, and $4,000,000 was subscribed—a large portion of which was to be expended on a canal; the Baltimore & Ohio was started on its successive short stages to the west; the Philadelphia & Columbia secured its charter, and the first section of the Charleston & Hamburg was opened. The Mohawk & Hudson Railroad, upon which the celebrated DeWitt Clinton locomotive and train were to make a trial trip in 1831, was also among the first ventures of this period.

It was built to connect the Hudson at Albany with the Erie Canal at Schenectady at a cost of $600,000, or $38,000 per mile.



ROBERT L. STEVENS, 1787-1856
Designer of the first "T rail" and the "hook head" spike

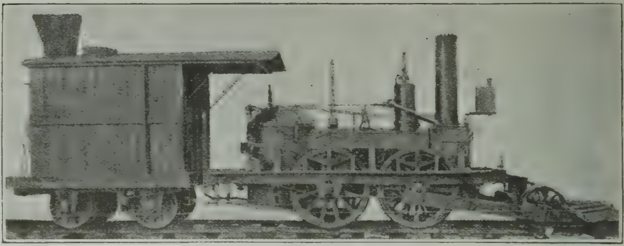
Contemporary with the engine built by Robert Stephenson for the Mohawk & Hudson road was the "John Bull" ordered by Colonel Stevens for the Camden & Amboy Railroad and Transportation Company in 1831 and put into service on November 12 of that year at Bordentown, N. J. After being out of service for many years, on April 17, 1893, it was once more put in commission to haul what was known as the "John Bull" train to the Chicago World's Fair. The train consisted of two of the original Camden & Amboy coaches and made the trip of 920 miles without assistance in five days—which was fine work for a 62-year old engine.



THE FIRST T RAIL
The shaded section is Stevens' original design as whittled in wood in 1830: The unshaded shows rail as made in England laid in the Camden & Amboy road, 1831.

The DeWitt Clinton was built for the Mohawk & Hudson Railroad, the pioneer company of the present New York Central Lines, at the West Point foundry in 1831, the year in which the road was opened from Albany to Schenectady. The familiar cut of the famous engine, with its train of old-fashioned stage coach pattern cars, is from a silhouette cut by Brown on the spot. The original of the cut is now in the Museum of the Historical Society at Hartford, Conn.

These may be regarded as the seedlings from which have sprung the mightiest system of railways in the world. All told, they are credited with only 23 miles of line in actual operation in 1830. Aside from the Baltimore & Ohio, which has held to its title through the intervening ninety years, these



THE "JOHN BULL"
Built in 1831 and now in the Smithsonian Institution, Washington, D. C.

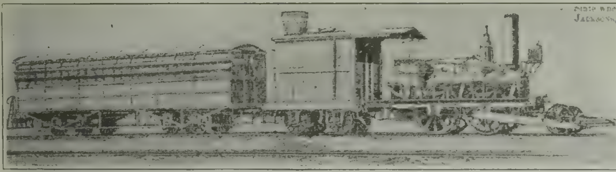
daring ventures are now respectively important divisions of the Pennsylvania System, the Southern Railway and the New York Central.

The coming of the advance agent of American industry and civilization was first announced on this continent by the shriek of the locomotive in the year 1831, "when the application of steam to blow a horn was first invented."

The Charleston & Hamburg, in point of performance, is entitled to precedence in the list of railways operated by

ANOTHER VIEW OF THE "JOHN BULL"

steam in the United States. It was chartered in 1827, and by January 1, 1830, six miles of road were ready for the first practical locomotive built in America. This was patterned after the "Stourbridge Lion," which had proved too heavy



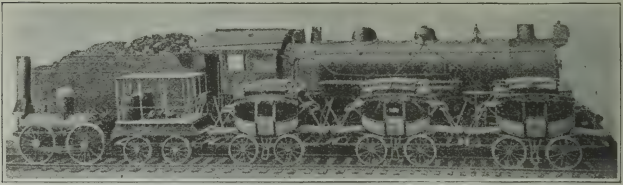
THE "JOHN BULL" AS IT MADE THE TRIP TO CHICAGO IN 1893

for the trestles of the Delaware and Hudson Railroad in August, 1829, and was built by Horatio Allen, who had assembled the parts of the discarded "Lion" when it arrived from England. The locomotive was christened the "Best Friend" of Charleston and was shipped to Charleston by packet in October, where it promptly ran off the track during its trial trip. It was of this locomotive that engineers like to tell

THE FIRST LOCOMOTIVE AND TRAIN RUN IN THE STATE OF NEW YORK

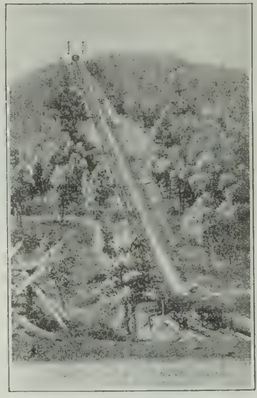
This sketch of the silhouette as it appeared in Brown's "History of Early Locomotives in America" was accompanied by the following note: The locomotive "De Witt Clinton" was ordered by John B. Jervis, chief engineer of the Mohawk and Hudson railroad, and was the third locomotive built in America for actual service upon a railroad. The machine was made at the West Point Foundry Works in New York, taken to Albany the latter part of June, 1831, and was put upon the road and run by David Matthew. The first experimental trial-trip was made on the 5th of July, and others at different times during that month. The first excursion trip, with a train of passenger-cars, was made from Albany to Schenectady on August 9, 1831, on which occasion the author of this History of the Early Locomotives in America rode in one of the cars (only the first two are represented above), and before the train started made the sketch as it appears above, which was pronounced a truthful representation of the locomotive, tender, and the first two of the number of cars in the train, and correct likenesses of the engineer and passengers represented in the cars. Some of them are yet living, as their letters in this work will show. The picture was cut out of black paper with a pair of scissors, a peculiar art with which the author was gifted from his earliest boyhood. The original was presented by the author to the Connecticut Historical Society; it was about six feet in length, and is yet preserved by the society and highly valued for its antiquity and truthfulness

the story that a negro sat on the safety valve until its boiler burst, projecting itself and the surprised Ethiopian twenty-five feet. The engineer and two negroes were injured, but none fatally.



DE WITT CLINTON TRAIN AND A MODERN LOCOMOTIVE

Nothing daunted, the company ordered a duplicate of its "Best Friend" called the "West Point," which was put in regular service early in 1831. This road was renamed the South Carolina Railroad. The expense of rebuilding it after the war forced it into a receivership in 1878, and after sale under foreclosure it was reorganized in 1881 as the South Carolina Railway, the convenient way of giving an old road a new name.

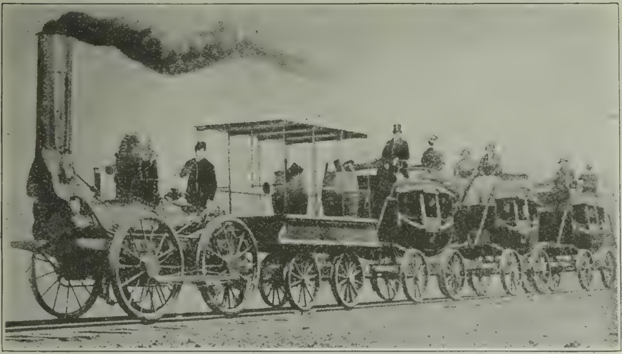


INCLINED PLANE AT MAUCH CHUNK, PA.
Lehigh Valley R. R.

It was on this road that the experiment of the tractive power of sails was tried with anything but satisfacfactory results.

The Charleston & Hamburg Railroad was a community enterprise organized, promoted and financed by the citizens of Charleston. It was proposed to rectify the freak of despiteful Nature that emptied the waters and water-borne cotton of the Savannah River

at Savannah instead of Charleston. The survey of this road is instructive, giving an almost straight line from Charleston to Aiken, South Carolina, and thence with a sharp bend dropping some 180 feet by an incline 3,800 feet down to the Savannah River opposite Augusta, then as now one of the great cotton centers of the South.



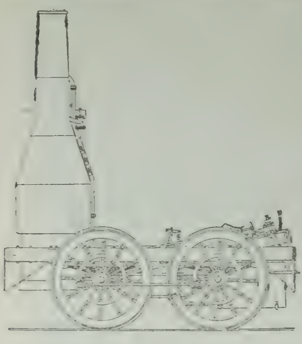
ANOTHER VIEW OF THE DE WITT CLINTON TRAIN

The road was financed almost entirely by private subscriptions. The municipality backed it with a small loan of $20,000. Built on the most economical basis, the bare roadbed and track were estimate to cost slightly under $600,000. When the bills were all paid, they figured up to $904,499, or exactly $5,625.92 per mile. The miscalculation arose, according to the annalist, from "the heightened cost of labor."

When completed the Charleston & Hamburg's 136 miles of track "was the longest railway in the world; and its operation was considered marvelous at the time." Owing to the lack of power, the company handled only cotton downward and light merchandise upward. Live stock, lumber and other articles that could pay only low rates, so the legend runs, "were declined for a time." The passenger rates fixed by the legislature were said to be so low "that a poor man could not afford to walk."

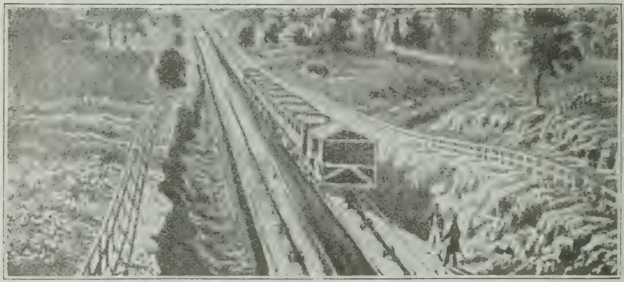
This road is now a division of the Southern Railway System.

The Columbia & Philadelphia had quite a chequered career before it became the main stem of the modern Pennsylvania System. Mention has been made of how this road was projected by Colonel Stevens, who got no farther. The legislature having repealed the charter granted Stevens in 1823, the state of Pennsylvania assumed the task of building a railroad from Philadelphia through Lancaster to Columbia, on the Susquehanna river. The line was located in 1828 and construction began in the year following.

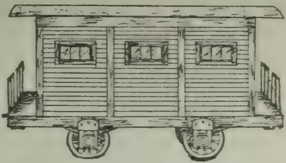


ORIGINAL DRAWING OF "BEST FRIEND"
First American Locomotive built for actual use

This was the first railway work undertaken and prosecuted by a State government in America. Immediately on leaving Philadelphia this line used what was known as the Belmont Inclined Plane just west of the railroad bridge over the Schuylkill river in West Philadelphia, and also a plane



THE BELMONT INCLINED PLANE
West Philadelphia



Passenger Coach used on the Portage Railroad over the Alleghanies in 1835

at the Columbia end, which was subsequently abandoned, and a new line built at the east end from Ardmore to West Philadelphia. About twenty miles at the eastern end was opened for travel in 1832, and by 1834 the entire line, double-tracked from the start, was completed. At first the power was furnished by horses and mules; private parties owned the passenger and freight cars and paid toll to the State for the use of its tracks. At this stage there was a strong resemblance between the railway and the highway, which has now wholly disappeared except for oratorical effect. At Columbia the rail ride ended

THE BEST FRIEND AND TRAIN
This engine was built in New York City for the South Carolina Railroad in 1830 and made an excursion trip as above on January 15th, 1831.

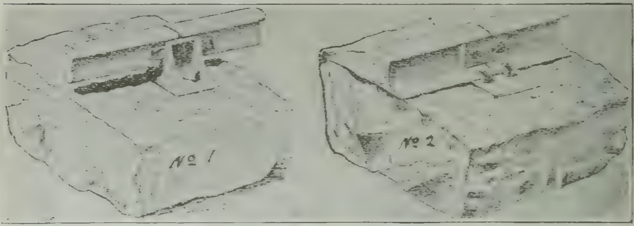
and the traveler took a canal packet up the river to the mouth of its tributary, the Juniata, thence up that stream to Hollidaysburg. Cars proceeded from here four miles to the foot of the Alleghenies.

From here let Charles Dickens describe what happened, as told in his "American Notes" of his visit to the United States in 1842:

"We left Harrisburg on Friday. On Sunday morning we "arrived at the foot of the mountain, which is crossed by rail-"road. There are ten inclined planes; five ascending, and "five descending; the carriages are dragged up the former, "and let slowly down the latter, by means of stationary "engines; the comparatively level spaces between being

"traversed, sometimes by horse and sometimes by engine "power, as the case demands. Occasionally the rails are laid "upon the extreme verge of a giddy precipice; and looking "from the carriage window, the traveller gazes sheer down, "without a stone or scrap of fence between, into the mountain "depths below."

And he tells how they "rattled down a steep pass, having "no other moving power than the weight of the carriages "themselves and saw the engine released long after us come "buzzing down alone, like a great insect, its back of green



EARLY AMERICAN RAILS AND TRACKS
No. 1 on the Pennsylvania portage of 1832
No. 2 first track on the Camden & Amboy in 1831

"and gold shining in the sun, that if it had spread a pair of "wings and soared away, no one would have had occasion, "as I fancied, for the least surprise. But it stopped short of "us in a very business-like manner when we reached the "canal; and before we left the wharf, went panting up the "hill again, with the passengers who had waited our arrival "for the means of traversing the road by which we had come."

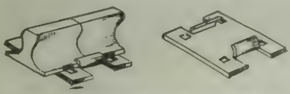
From that point the novelist took a canal packet on to Pittsburgh and thence on by steamboat to Cincinnati, at that time described by him as "a beautiful city" of fifty thousand souls, "cheerful, thriving and animated."

Anyone who wishes to get a definite impression of travel by side-wheel ocean steamer from Liverpool via Halifax to Boston, "out eighteen days," and by rail and steamboat south to Richmond and west as far as St. Louis should hunt up

Dickens' "American Notes." They may make the reader angry, for the writer extenuated nothing, but took in everything with the eye of London's greatest newspaper reporter.

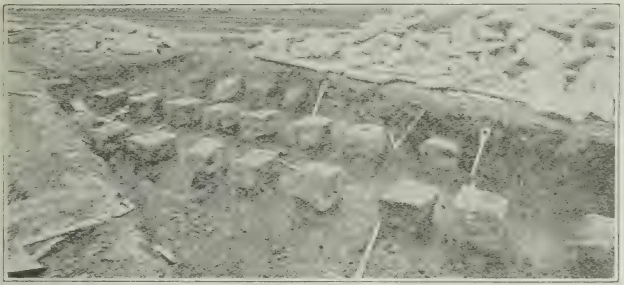
The Lure of the West

Maryland responded to Pennsylvania's great feat of crossing the Alleghenies by enacting a bill in 1836 that authorized a loan of eight million dollars in aid of a comprehensive scheme to build railroads and canals to connect Baltimore and the Ohio river. The method of constructing the Baltimore & Ohio is thus described in an official report in 1832:



WROUGHT IRON RAIL CHAIR

"A line of road is first graded, free from short curves and as nearly level as possible. A small trench is then formed for each track, which is filled with rubble stone, on which are laid blocks of granite or other suitable stone about one foot square and of as great length as can be obtained. The upper and inner surfaces of each track are dressed perfectly even, as well as the ends of the blocks at their joinings. Bars or plates of wrought iron, near an inch in thickness, are then laid on these blocks or rails, in line with the inner surfaces, and fastened to the stone with bolts or rivets, entering

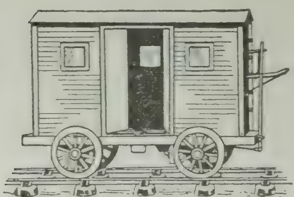


STONE BLOCKS, USED INSTEAD OF TIES IN EARLY CONSTRUCTION OF THE PHILADELPHIA & READING RAILWAY

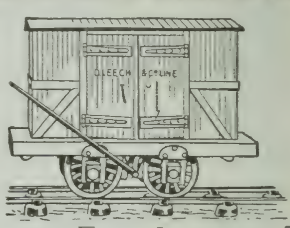
about four inches in holes fitted to receive them, at a distance of about eighteen inches. The distance between the two tracks, for the wheels, should be about five feet."

The cost of a road like this, sans rolling stock, stations, etc., was figured at $28,173 per mile.

The stream of emigration to the west at this period was sweeping the industrious poor from the Atlantic coast in hordes that demanded more rapid transportation than canal boats and pack mules could furnish; and Europe was called on to furnish construction funds on State guarantees at any rate of interest. The State of Indiana alone in 1836 provided for the construction of over 1,200 miles of railroad and canal, to cost upward of twenty million dollars, and "authorized State stock to the amount of ten million dollars to be issued and sold abroad," as the historian McMasters dryly remarks. And he continues, "The system of internal improvements on which Illniois now (1836) entered was, if possible, wilder still."

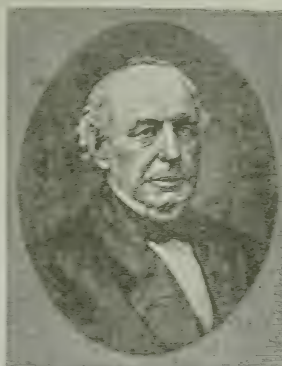

THE FIRST BOX CAR

The West was now growing at a tremendous pace. Between 1830 and 1840 Indiana had almost doubled in population, from 343,031 to 685,886, while the rate of increase in the younger State of Illinois was even greater, having more than trebled from 157,445 to 476,183. Chicago was incorporated as a city in 1837, with a population of 4,170 and one newspaper, the *Chicago Democrat*, merged into the *Chicago Tribune* in 1841. Dickens returned from St. Louis to Cincinnati via Louisville, the way he had come, apparently never having heard of Chicago!


IMPROVED BOX CAR

Baldwin's First Locomotive

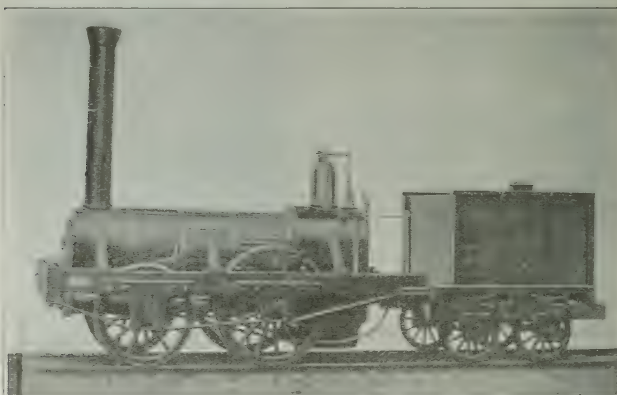
Among the noted group of locomotives that claimed precedence in the early history of American railways must not be overlooked—"Old Ironsides," the pioneer handiwork of the house of Baldwin, whose product stretches in an uninterrupted line from 1832 to this day. Matthias Baldwin, its constructor, was a jeweler and watch repairer of Philadelphia, with a limited knowledge of mechanics. But he had the genius and persistence to attempt anything in the mechanical line that crossed his vision. The jewelry trade falling off, Mr. Baldwin became a partner in the manufacture of binders, tools and cylinders for calico printing. This proved so successful that the service of steam power was necessary to supply the demand, and Mr. Baldwin undertook to design an engine for that purpose. The firm's space being limited, an upright model was adopted. The machine was so successful that it turned his attention to steam engineering and thus undoubtedly directed his thoughts to the engine on rails along which he was to go so far. At the suggestion of a fellow townsman he built a diminutive model of a steam locomotive which actually pulled two small four-seated cars around a circular track in the Philadelphia Museum in April, 1831. This demonstration led the directors of the Philadelphia, Germantown & Norristown Railroad (now a part of the Philadelphia & Reading System) to engage Mr. Baldwin to build a full-sized locomotive to supplant horse power on their road. The parts of the "John Bull," imported from England for the Camden & Amboy Railroad, had just arrived, and before they were put together Baldwin availed



MATTHIAS W. BALDWIN—1795-1866
Inventor and founder of the Baldwin Locomotive Works

himself of the opportunity to make an intimate and critical study of them. Then he went back and built "Old Ironsides," which on November 23, 1832, gave a successful demonstration.

As described in the "History of the Baldwin Locomotive Works," "Old Ironsides" was a four-wheeled engine, modeled essentially on English practice of that day, as shown in the "Planet" class, and weighed, in running order, something over



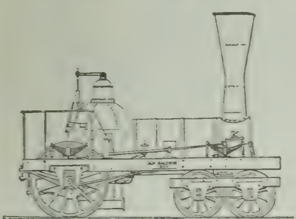
"OLD IRONSIDES"
The first Baldwin Locomotive completed in 1832 for the Philadelphia Germantown & Northern Railroad

five tons. The rear or driving wheels were fifty-four inches in diameter on a crank axle placed in front of the firebox. The cranks were thirty-nine inches from center to center. The front wheels, which were simply carrying wheels, were forty-five inches in diameter on an axle placed just back of the cylinders. The cylinders were nine and one-half inches in diameter by eighteen inches stroke and were attached horizontally to the outside of the smoke-box, which was D-shaped, with the sides receding inwardly, so as to bring the center line of each cylinder in line with the center of the crank. The wheels were made of heavy cast iron hubs, wooden spokes and rims and wrought iron tires. The frame was of wood.

placed outside the wheels. The boiler was thirty inches in diameter and contained seventy-two copper flues, one and one-half inches in diameter and seven feet long. The tender was a four-wheeled platform, with wooden sides and back, carrying an iron box for a water tank, inclosed in a wooden casing and with a space for fuel in front. The locomotive showed twenty-eight miles an hour on its trial trip and subsequently attained thirty miles an hour with its usual train attached. Mr. Baldwin was to have received $4,000, but owing to some defects in performance compromised on $3,500.

From that halting success ninety-two years ago, the first effort of an unskilled mechanic, has descended the long line of locomotives that has carried the name of their builder around the globe.

In 1836 William Norris demonstrated that his locomotive could ascend the Schuylkill inclined plane at the rate of ten miles an hour. This plane had a grade of 359 feet to the mile.



BALDWIN LOCOMOTIVE—1834

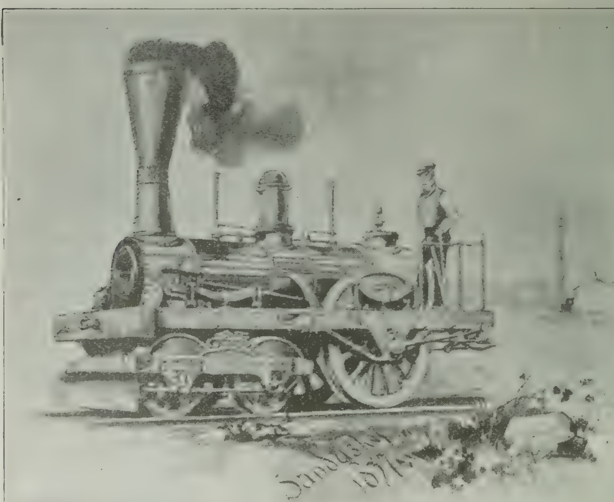
The labor cost of running the railways in those early days may be judged from the pay roll of the Parkersburg shops (Philadelphia & Columbia Railroad), where 31 employes, consisting of 1 manager, 1 foreman, 13 machinists, 3 blacksmiths, 1 coppersmith, 2 file makers, 1 pattern maker, 3 carpenters, 1 stationary engineer, 4 assistants and 1 watchman, received $1,087, or $35 a month per man. At the same time enginemen received $2 a day and firemen $1.25.

New York's Belated Start

New York City, with its outlook to the sea, its island-locked sound to New England and its North river, the Hudson, to the interior of the State, had more faith in waterways and their connecting canals than in the steam and iron roads that met with such popular enthusiasm to the North and

South. Its first railroad, the New York & Harlem, was not chartered until April, 1831, and was not opened until January, 1833. It was projected to run from New York to Chatham, via Dover Plains, 130 miles, but the first eight miles from near the City Hall to the Harlem river was the section that counted and justified its title.

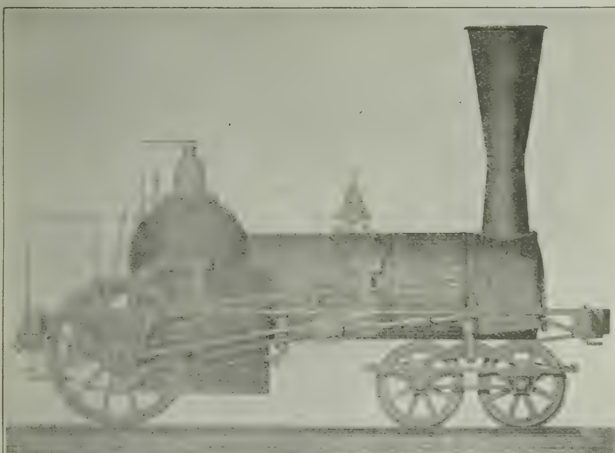
The New York of 1831 (p. 390) was a modest but aspiring



Pioneer of the American Locomotive Co.'s line

village of some 200,000 souls. It occupied the southern end of Manhattan Island. The trip to the "Harlem Strait," as it was then properly called, was like a journey into a far country. So it is not surprising to read that the route of this first metropolitan railway, leaving City Hall Square, passed along Center and Broome streets, and thence via Fourth avenue to the Harlem. It was the boast of its builders that its first section of eight miles cost $1,100,000, or $137,500 per mile, being the most expensive piece of railway property in the United States prior to 1839.

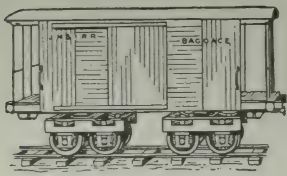
In 1873 this road was leased to the New York Central & Hudson River Railroad. The lease included the tracks to 42d Street and the Grand Central Depot, but "not the horse railroad on Fourth Avenue." For years the company preserved its charter from lapsing by running a box car from 42d to Chambers Street, to which the writer was a witness in 1879, when, returning from a midnight assignment for the



REPRESENTATIVE BALDWIN LOCOMOTIVE OF 1839

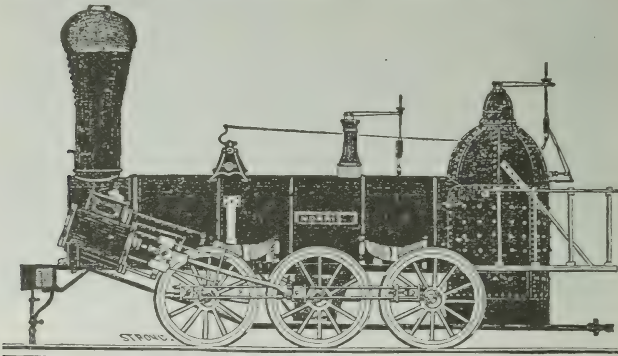
New York Tribune, he saw this solitary sentinel car propelled down the Bowery by a Julien motor and storage battery.

It is one of the paradoxes of American railways that the New York Central Railroad, which was to become one of the chief factors in American rail transportation, for the better part of half a century had no entrance of its own into New York City. If the student will consult a map of New York, he will perceive at a glance that the New York & Harlem road was headed not up the Hudson but as far from it as the Massachusetts line would permit and was destined to reach



PRIMITIVE BAGGAGE CAR
Initials probably stand for Jefferson, Madison & Indianapolis Railroad

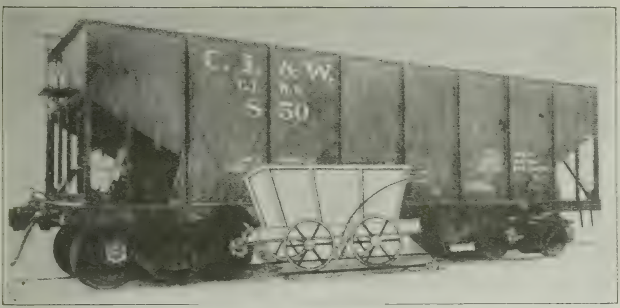
Albany over the Boston & Albany via Chatham Junction. This idiosyncracy was undoubtedly due to New York's early and unshaken faith in the Hudson as the direct line from the Island of Manhattan into the wilderness beyond Troy. It was not until 1846 that it turned its eyes to that inviting valley that pierced the state between the Catskills and the Berkshire Hills, and petitioned the legislature to charter the Hudson River Railroad. This road was opened from New York to Albany, 144 miles, in 1851.



NORRIS FREIGHT ENGINE

Anticipating the course of this history, it may be remarked that the completion of the Hudson River Railroad prepared the way for the consolidation of the several independent lines that had finally connected Albany with Buffalo. There were as many of these as there were shades in Joseph's coat of many colors. The Albany & Schenectady, chartered in 1826, naturally headed the list; then came the Schenectady & Troy; the Utica & Schenectady; the Syracuse & Utica (the Syra-

cuse & Utica direct); the Rochester & Syracuse (direct); the Auburn & Syracuse; the Auburn & Rochester; the Buffalo and Lockport; the Mohawk Valley; the Rochester, Lockport & Niagara Falls, and the Buffalo & Rochester. With the acquisition of the Hudson River Railroad, the consolidation of the New York Central & Hudson River Railroad was complete from New York to Buffalo and went into effect on Au-



A STUDY IN CONTRASTS
A coal car in 1830 and a coal car of today

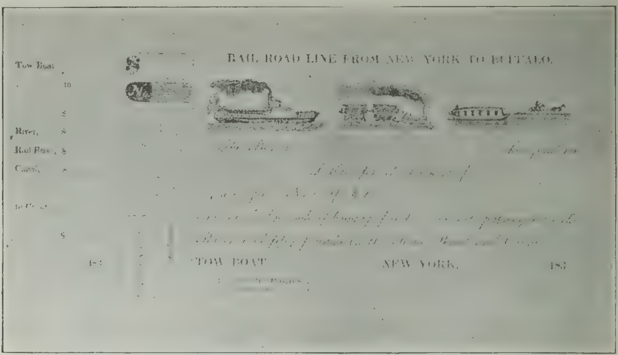
gust 1, 1853. The enumerated links in this New York Central chain were so many independent companies, each proud of its own primitive facilities and each jealous of its connections. Passengers had to disembark at the end of each road and take passage on the next link, when its conductor was ready to start.

Its further extension to Detroit, Cincinnati, Chicago and St. Louis is another story. Up to the close of 1840, parts of the New York Central System had not penetrated beyond Rochester.

The New York & Erie

Surely a spiteful fairy presided over the birth of the New York & Erie Railroad, the forerunner of the great trunk line that, after many vicissitudes, was to connect New York with

Chicago. Its charter ran from tidewater to Lake Erie, but unfortunately the State of New Jersey lay between its projected line and tidewater at Jersey City. It had therefore to be content with such tidewater as ebbed and flowed at Piermont, which derived its name from a pier one mile long jutting out into the Hudson some twenty-five miles from the promised terminal in New York city. If the State of New


RAIL ROAD LINE FROM NEW YORK TO BUFFALO.

Tow Boat

River,

Rail Road,

Canal,

TOW BOAT NEW YORK,

UNIQUE PASSENGER TICKET ISSUED IN 183?

By steamer to Albany, by rail to Schenectady, by canal boat to Buffalo—Note the restriction on baggage

Jersey had been less jealous of its big neighbor, the "Story of Erie" might have been far different from the "chapter" told in the famous brochure written by Charles F. Adams thirty-odd years later. Even Mr. Adams had to place the tribute of foresight on the "citizens who originated and forced through to completion this great national work, as important as was ever the Appian Way to Rome."

"The road was in truth," he wrote, "a magnificent enterprise, worthy to connect the great lakes with the great seaport of America. Scaling lofty mountain ranges, running through fertile valleys, and by the banks of broad rivers, connecting the Hudson, the Susquehanna, the St. Lawrence and the Ohio, it stood forth a monument at once of engineering skill and commercial enterprise." But, like a certain man

journeying from Jerusalem to Jericho, the Erie fell among thieves, who stripped it and left it for dead. Every attempt to revive it has run into a business depression or panic. And, although today it runs through that same favored region, renders good service to its territory and earns substantial revenues per mile, it barely meets operating expenses and fixed charges.

The total cost of the 394 miles of railway built in New

"THE APPIAN WAY" AS IT STILL EXISTS

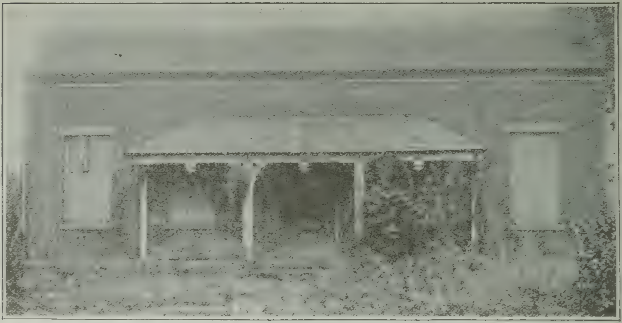
York State between 1832 and 1840, inclusive, was estimated at $9,578,965.

Early New England Roads

The first railway in Massachusetts, as well as in the United States, was appropriately enough an industrial tramway. It ran from Bryant quarries about three miles to tidewater at Neponset and was used to transport blocks of granite by horse power. Its construction is interesting beyond the fact that it carried the stone for Bunker Hill monument. Its own tracks were laid on the same granite material. These stone sleepers were placed eight feet apart. On these, great wooden rails a foot high and six inches thick were laid. Flat strips of iron three inches wide and a quarter of an inch thick were fastened by spikes to the top of the wooden beams. And so the first railroad in America was equipped for business. Railway, in the modern sense of the word, this little granite road of Massachusetts never was. It was operated by gravity and

horse power and never rose to the dignity of a railroad until it was purchased by the Old Colony Company in 1872, when it was relaid with T-rails and the steam whistle re-echoed among the boulders on its ancient right of way.

Mention of the Old Colony Railroad introduces the reader to a group of familiar names associated with the early history of New England railways.



CLAIMED TO BE "THE FIRST STEAM RAILWAY DEPOT IN AMERICA"
It stood, until recently, at the top of Crane Street hill, Schenectady, New York, being a one-story brick structure with a chimney at either end.

First of these was the Boston & Lowell, chartered in 1830 and opened for the twenty-six miles to Lowell in 1834. The rails for this line were laid on stone blocks, which in turn rested on deep foundations of broken stone.

Its companion road, the Boston & Worcester, then as now forty-four miles from the Hub to Worcester, was built in the same substantial manner and both were soon found to be too rigid and inelastic for comfortable riding. This mistake was avoided in the construction of the Boston & Providence, where wooden sleepers were laid from the first, thus rendering the subsequent relaying of ties unnecessary.

These three Massachusetts roads employed horse power on their earlier sections. In the spring of 1834 the Worcester road invested in two locomotives, appropriately named the "Meteor" and the "Rocket." One of these was capable of

doing twenty miles an hour. They made two trips daily from Washington Street to Newton, eight, nine or ten miles, according to which of the famous Newtons was the first termination of the track. The fare was 37½ cents each way, showing the survival of the old York shilling, which afterwards became the "bit," or 12½ cents, in California as late as the seventies.

PEEKSKILL LANDING ON THE HUDSON IN 1837

The first train to make the whole trip to Worcester, consisting of a locomotive and one passenger car, was run on July 3, 1835, to be in readiness for the formal opening on Independence Day, when four locomotives made two round trips, carrying, all told, 1,500 travelers for the celebration.

The fare was $1.50 for the trip, where formerly it had been $2 by stage. An enterprising merchant of Worcester was so impressed with the advantages of the new means of transportation that he immediately offered to build a side track to his storehouse.

The Boston & Providence was opened a few days before the formal opening of the Boston & Worcester, but owing to

some difficulty in getting its one locomotive to work, horses had to be hitched up to the company's two passenger cars. But June 2, 1835, the day set for the steam railway trip, was made forever memorable by the combination of stage and steamboat transport from Boston to New York in less than sixteen hours. In this signal performance Cornelius Vanderbilt participated by building the fine but ill-fated steamboat "Lexington." It made connections at Providence with passengers who started from Boston by stage at 2 A. M. and landed them in New York at 6 P. M. The "Lexington" was destroyed by fire on January 12, 1840, with a loss of 120 lives.

As soon as the Boston & Providence locomotive was put in running order, the time of June 2, 1835, was quickly eclipsed, and from that day until an all rail route was opened in December, 1848, the rail and water passage between Boston and New York, via Providence, had things its own way.

With the combination of rail and steam boat in 1835, the gap between Boston and New York was reduced from four days to about fourteen hours, but the rivalry was not lessened. The two seaports engaged in a desperate race to see which should be first to get to Albany by rail.

Of equal interest with the water and rail connection between Boston and New York is the introduction of the name of Cornelius Vanderbilt in this narrative. Although at the time of building the "Lexington" he was forty-one, he had not entered upon his career as the foremost railroad manager and financier of his time. His forte, as Artemus Ward would say, was steamboats. While still a lad in his teens he bought a

ferryboat and ran it so successfully between Staten Island and New York that it was not long before he acquired a small fleet of ferryboats and was known about New York harbor as the "Commodore." He had what might be termed the Vanderbilt or Midas touch that turned everything he handled on sea or dry land into gold. By the time he was just over fifty his ventures in ship-building and managing had amassed what for those days was the vast fortune estimated at $10,000,000.

Then he took to railroading and in a very short time became the leader in land transportation. He first bought a controlling interest in the New York & Harlem road and, having acquired the essential entrance into the heart of Manhattan Island, he annexed the principal interest in the Hudson River Railroad and eventually in the New York Central. He was the moving spirit in the consolidation of the independent railroads between Albany and Buffalo, and ultimately extended the sway of the New York Central System over the Lake Shore, the Canada Southern and the Michigan Central to Chicago. For fifteen years, from 1862 to the time of his death, in 1877, Cornelius Vanderbilt was the dominating figure in American railway affairs.

The Panic of 1837

But the railways of the United States were not to go through the first decade of their feverish existence without experiencing some of the throes generally attendant on overdoing anything. The initial cost of construction of the early railroads and canals had imposed a heavy burden upon the capital and industry of the country. In projecting new roads they overshot current demands. As a result, according to Poor's **Manual,** in many states, especially Western and Southern, large sums of money were expended upon lines from which there was no return, while many, approaching completion, were wholly abandoned. Charters and work begun in 1834-1836 were held in abeyance, not to be revived until along in the early forties, when the effects of the panic of 1837 began to wear off.

The case of the Galena & Chicago Union, the predecessor of the Chicago & North Western, is illustrative of the railway condition prevailing throughout the country at this time. It had received a special charter from the legislature of Illinois in January, 1836, to build a railroad out into the prairie country toward the Mississippi. Under an amended charter a short preliminary survey was made and the company obtained 940 acres of woodland nine miles west of Chicago to secure a source of fuel supply. "Then," says the historian of the period, "the financial 'panic,' beginning in the summer of 1837, put a stop to this and many other railroad projects not only in Illinois but all over the United States."

The actual construction of the Galena & Chicago Union was not resumed until 1847. In the meantime Chicago had been incorporated and quadrupled in population—from 4,179 in 1837 to 16,859 in 1847. It was only a few years earlier (1833) that the historian Charles Cleaver "saw many teams stuck fast in the streets of the village" and "remembered that once a stagecoach got mired in Clark Street, opposite the Sherman House, where it remained several days with a board driven into the mud bearing the inscription, 'No bottom here'."

Today Chicago is the greatest railway center in the world, from which radiate more than 90,000 miles of railway to every corner of the Union.

Michigan Tries Railway Ownership

It was the financial collapse of 1837 that induced the State of Michigan to take over the construction of the railways it had already chartered and assisted in the preliminary stages. These roads were the Erie & Kalamazoo Railroad, chartered in 1833 (now merged through the Lake Shore into the New York Central System), and the Detroit & St. Joseph, chartered in 1836 (the original Michigan Central). The latter company was capitalized at $2,000,000, but no work had been done on it when the State of Michigan undertook its completion. By the aid of successive appropriations, this road was completed to Kalamazoo, 144 miles. In December, 1844, when 110 miles of the Central had been completed and some

terminal work on the Southern was in progress, the joint enterprise had cost Michigan the following amounts:

Central construction		$1,842,308
Southern construction		936,295
		$2,778,603
10 per cent for interest and other incidental expenses		277,860
Palmyra & Jackson R. R. included		30,000
Locomotives and cars on Central R. R.	$110,000	
Ditto on Southern R. R.	51,000	161,000
Total		$3,247,463

Governor Barry recommended the sale of the roads, to which the Legislature agreed, and they were subsequently sold to Boston capitalists for $2,000,000 and $500,000, respectively. Payment was made in state bonds at their face, which the purchasers had shrewdly bought in at 70 cents on the dollar, thereby securing property that had cost at least three and a half million for $1,750,000. Query, what would be considered the original cost of that road?

Such were the bargains that were scattered all over the country by the panic of 1837, to be snapped up by the thrifty capitalists who had the courage of their faith in the future of railroads in the United States. They had their reward, and had not long to wait for it, either.

Summary of the First Decade

Nothing in the amazing expansion of transportation by rail on this continent equals, in all that constitutes the American character, the period whose salient features have so far been briefly sketched. The mental alertness and daring with which every invention and opportunity was seized on and adjusted to the peculiar conditions of this country were everywhere in evidence. Steam power, applied at first on the water and then on the land; the locomotive adapted or simultaneously invented in American shops; the experiments with rails, ties and foundations that finally were replaced by the wooden sleepers, stone ballast and T-rails that we have with us today; the rivalry between canals and railways that held over into the next generation; the actual moving of American civilization dependent on speedy and powerful transportation

from the fringe of Eastern States to the valley of the Mississippi—it was all a part of the development of Anglo-Saxon traits in a new world, under conditions that never before confronted mankind, but for which mankind had been waiting and preparing from the dawn of time. What happened on this continent between 1830 and 1840 cannot be more clearly expressed than by the figures of population and railway mileage during that period:

United States—1830 to 1840

	Population	Miles of Railway
1830	12,866,020	23
1831	13,252,000	95
1832	13,571,000	229
1833	13,924,000	380
1834	14,319,000	633
1835	14,743,000	1,098
1836	15,127,000	1,273
1837	15,532,000	1,497
1838	16,037,000	1,913
1839	16,540,000	2,302
1840	17,069,453	2,818
Per cent increase	32.67	12,108.7

From such insignificant beginnings the percentage of railway increase means nothing, but for the two years between 1838 and 1840 a 47 per cent increase gave promise of the transformation in transportation that was impending. How the mileage of 1840 was distributed among the states is an interesting exhibit:

Mileage by States in 1840

	Miles of Railway	Population
Alabama	46	590,756
Connecticut	102	309,978
Delaware	39	78,985
Georgia	185	691,392
Kentucky	28	779,828
Louisiana	40	352,411
Maine	11	501,793
Maryland and D. C.	213	513,731
Massachusetts	320	737,699
Michigan	50	212,267
New Hampshire	53	284 574
New Jersey	186	373,306
New York	374	2,428.921
North Carolina	53	753,419

Ohio	30	519,467
Pennsylvania	754	1,724,033
Rhode Island	50	108,830
South Carolina	137	594,308
Virginia	147	1,239,797
Total	2,818	13,795,495

As the total population in 1840 was 17,069,453, this would leave 3,273,958 inhabitants of the balance of the United States without any railway connection whatever. They had for the most part to get along with such highways and waterways as had served the transportation needs of the preceding generations. But, if the completed mileage was woefully short of the expanding needs of the republic, there was no lack of prospectuses The land from the Atlantic to the Mississippi was alive with projects. Tanner, in his "Description of the Canals and Railroads of the United States," published in 1840, enumerates no less than 409 fully chartered railroad companies. The spirit was willing and universal, but the funds were weak and local to territory that promised some return.

There are no really reliable figures as to the original cost of construction of the early railroads. From scattering reports, it appears that 1,727 miles of the lines in operation in 1840 cost approximately $57,940,000, or roughly $33,500 per mile. This would place the cost for the reported mileage in the neighborhood of $95,000,000, which may be accepted as a conservative estimate.

These figures are probably far within the actual cost of the roads when fully completed and equipped. In many instances they did not include anything for stations, shops, etc., and in some cases neither power nor equipment was included, for the idea that a railway was a highway or a toll road died slowly.

Among the roads that cost more than the average may be mentioned the Boston & Lowell, $56,600 per mile; the Great Western, now part of the Boston & Albany, $36,104 per mile; the Boston & Providence, $43,460 per mile, and the Boston & Worcester, $38,700.

The eight-mile section of the New York & Harlem, built through New York City before 1839, cost what was then considered the fabulous sum of $137,500 a mile, but there were many roads in England at that time that paid as much for the bare right of way. The Mohawk & Hudson cost $38,000 and the cost of the Erie, as first built, exclusive of engines, cars and other equipment, was $43,333 per mile.

The cost of the Philadelphia & Columbia, the first section of what is now the Pennsylvania, was $53,047, exclusive of depots, shops, etc., while that of the Allegheny Portage road that connected it with Pittsburgh was $1,634,357, or $44,545 per mile.

The first section of the Philadelphia & Reading cost $52,630 per mile.

In the South the combination of sandy soil, easy grades, cheap lumber and cheaper labor resulted in reduced cost of construction, and many of the early roads cost less than $15,000 a mile. When the roads once got beyond the mountain barriers, the broad plains of the West offered few obstructions to the laying of rails straight and level in every direction then within the vision of railway prospectuses. In a single decade railway promotion had outstripped the demands of traffic.

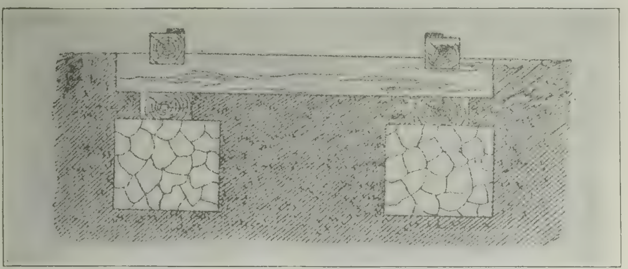
The Medley of Gauges

Between the two-foot tramway and the six-foot broad gauge there was scarcely an intermediate width of an inch that was not experimented with in the early days of American railway exploiting.

It was different in England. The gauge of the railway was fixed by Parliament in 1830 to be not less than four feet eight inches between the inside of the rails and between the outside edges not more than five feet one inch. There was much virtue in the word "more" in this Act, for it left the tread of the wheel to the discretion or whim of the car builder. It is worth recording that when Thomas Meynell, chairman of the Stockton & Darlington Railway Company, officiated at the laying of the first rails in Stockton on May 13,

1822, he placed them four feet eight inches apart, thus practically determining the standard gauge for Great Britain and really setting the fashion which ultimately a vast majority of the world's railways were to follow. The rails laid on that occasion were malleable iron bars, fifteen feet long and twenty-eight pounds in weight, and the first to be used by a public railway company.

In America a number of the earlier roads, including those of New England and several in Pennsylvania and New York State, adopted the English gauge of four feet eight and one-



TRACK OF THE ALBANY & SCHENECTADY ROAD IN 1837
Note the strip of iron on the edges of the timber rail, cross ties of wood with foundations of broken stone topped by timbers

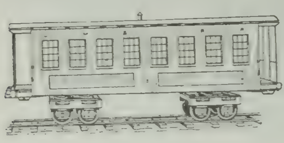
half inches, but thereafter American engineers adopted such width of track as seemed best suited to their local conditions. The road between Albany and Schenectady had a gauge of four feet nine inches; the Camden & Amboy adopted a gauge of five feet, and that gauge prevailed throughout the South until after the Civil War. The Erie started with a gauge of six feet and maintained that broad distinction up to 1878, when after careful planning, but with dramatic alacrity, it made this continent practically unanimous for the standard gauge.

The general features of American railway track up to the close of the first decade of construction are shown in the following table:

	Date	Length in Miles	Gauge in Feet and Inches	Cross Ties, Size in Inches	Wooden Rails, Size in Inches
Mauch Chunk (Pa.)	1827	9	3.6	Oak	4x6
Schuylkill (Pa.)	1829	13	4.8½	Oak 12x12	4x7
Mill Creek (Pa.)	1829	3	..	....	3x5
Schuylkill Valley (Pa.)	1829	10	3.4	....	3x5
Mt. Carbon (Pa.)	1829	7¼	4.8½	....	6x4
Baltimore & Ohio (Md.)	1828	13	..	*Cedar	6x6
Quincy (Mass.)	1826	3	5	Granite	...
Charleston-Hamburg (S. C.)	1829	6	5	Wood	6x10
Albany & Hudson (N. Y.)	1830	17	4.9	Wood 7x7	...
Delaware & Hudson (Pa.)	1829	5	..	Hemlock	6x12
Western (Mass.)	1837	54	4.8½	Wood 7x12	Iron
Long Island (N. Y.)	1835	12	4.8½	Cedar 6x6	Iron
Erie (N. Y.)	1836	10	6	Wood	Iron

*Some stone slabs.

It was in the last year of this decade that a young man named Ulysses S. Grant, having been entered at West Point, took passage on a steamer at Ripley, Ohio, for Pittsburgh. "Western boats," he says in his *Memoirs,* "at that day did not make regular trips at stated times, but would stop anywhere and for any length of time, for passengers or freight. I have myself been detained two or three days at a place after steam was up, the gangplanks, all but one, drawn in, and after the time advertised for starting had expired. On this occasion we had no vexatious delays and in about three days Pittsburgh was reached. From Pittsburgh I chose the canal to Harrisburg, rather than the more expeditious stage. * * * From Harrisburg to Philadelphia there was a railroad, the first I had ever seen except the one on which I had just crossed the summit of the Allegheny Mountains and over which canal boats were transported."



EARLY EIGHT-WHEEL PASSENGER CAR

Miscellaneous Notes

The first severe railway accident in the United States occurred on the Amboy & Bordentown Railroad October 8, 1833, in which several persons were killed.

The modern American silver dollar of 412.5 grains dates back to the Act of Congress of January, 1837. The dollar would buy less transportation then than now.

The average passenger car of that period measured thirty-five to forty feet in length, with a width of about eight feet, and was six feet six inches high. The aisles were narrow and

CANAL BOAT BEING HAULED OVER THE PORTAGE ROAD IN 1839

the seats too short to accommodate two adults comfortably. Their ventilation was primitive, and sleeping in a recumbent posture only possible in an upright dream. In summer these cars were stifling and in winter their temperature ranged from red-hot near the iron stove at one end to zero at the other. And yet travel by rail was so much more expeditious that it was welcomed by all classes as a relief from the tribulations of the stage coach and the tortoise pace of the canal boat.

Arksanas admitted as the twenty-fifth state June 15, 1836.
Territory of Wisconsin organized July 4, 1836.

Michigan admitted as the twenty-sixth state January 26, 1837.

Great commercial panic began in March and reached its height in May, 1837, when all the banks in New York suspended specie payment and embryo railway companies sought shelter in the courts.

Rev. Elijah P. Lovejoy, publisher of the Alton *Observer,* shot dead by a mob at his office November 7, 1837, one of the premonitory signs of the national struggle culminating in the Civil War that practically wiped out all the railways then built south of Mason & Dixon's line.

First regular passage by steamer across the Atlantic. The "Great Western" and the "Sirius" both arrived at New York April 23, 1838.

Iowa received territorial government June 12, 1838, not becoming a state until March, 1845.

Dangers of river navigation in the West shown by losses of fifty-five steamers on the Mississippi, thirteen on the Ohio, two on the Missouri, two on the Illinois, one on the Arkansas and four others during the year 1838.

Daguerreotypes first taken in the United States August, 1839. The illustrations in this book can be traced back to the development of this process, the halftone not coming into general use until the early eighties, previous sketches being from drawings or working models.

Throughout this decade the idea of the transmission of messages by electricity was simmering in the mind of Samuel Finley Breese Morse. His first complete instrument was exhibited in New York in 1835 and he filed his *caveat* for a patent in Washington in 1837. He was refused a patent in England and obtained a useless *brevet d'invention* in France. After four years of discouraging importunity he finally got an appropriation of $30,000 for an experiment of his invention on line between Washington and Baltimore, over which, from the Supreme Court room in the capitol to Baltimore on May 24, 1844, was flashed the message, "What hath God wrought." From that day the telegraph became an indispensable adjunct in the operation of American railways, and with that epochal step in the march

of human progress we take leave of the great railway decade of 1830-1840.

Poverty and prejudice presided at the birth of rail transportation in America, and panics rendered their early development fitful and precarious. Only the indomitable optimism of our race pushed the rails westward in advance of civilization.

CHAPTER III

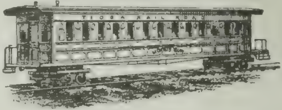
THE SECOND DECADE, 1840 to 1850

RAILWAY PROGRESS—DR. LYMAN ABBOTT DESCRIBES THE MAKING OF AN AMERICAN RAILWAY

IF the reader will draw a straight line on the map of the United States from Rochester, N. Y., the western terminal of the chain of little railroads pushing valiantly from Albany to Buffalo, to Pensacola, Florida, on the Gulf of Mexico, the southern terminal of the Alabama, Florida & Georgia Railroad, in a rough way he will locate the dividing line between railroad accomplishment in 1840 and the great beyond. Nowhere had construction followed prosperity into the vast West which Washington had visited and viewed with the vision of prophecy nearly four score years and ten earlier. The Portage Railroad over the Alleghenies had ended at Johnstown, some thirty-eight miles short of Pittsburgh, the Fort Duquesne of Washington's western wanderings.

SAMUEL F. B. MORSE, 1791-1872
Perfector of Electric Telegraph
"What Wonders Hath God Wrought!"
May 24, 1844

Up to 1840 canals had shown the way in the conquest of the West. They had the inside track with the Federal and State legislators of that day, and the financiers of New York and Philadelphia lent a receptive ear to undertakings that promised and actually paid 8 per cent on investments, where the railway averaged less than 5½ per cent.



TIOGA RAILROAD CAR OF 1840

Besides tales were floated around that a particularly favored canal in England averaged 112 per cent on its cost.

Under such favoring influences the Erie canal had been pushed through to Buffalo and was paying handsomely, and the State of Ohio was traversed by 1,000 miles of canals connecting the great lakes with the Ohio river. It has been estimated that $250,000,000, or about $30,000 a mile, was invested in American canals before investors saw the rail writing on the map and began to put their money cautiously and grudgingly into the more flexible and speedy means of modern

CHICAGO IN 1842

internal communication. Waterways could not be made to run up hill and railways could, and in that single phase of the law of gravitation was written the doom of canals on this continent of alternating plains and mountains. The normal current of the Mississippi rendered it impotent to compete with the light but high speed locomotives of the forties. Today the chief objective of its improvement is an appropriation.

By 1842 it was estimated that all the states had appropriated or invested $60,000,000 for canals to $43,000,000 for railways, and it was said that *the few* were prosperous and *the majority* were insolvent. But the needs of the country were such that they continued to raise, beg and borrow—principally borrow—money for both.

The First Wave of Immigration

Prior to 1840 the United States was divided into two main sections, Eastern and Western, separated by the Allegheny

CHICAGO IN 1924—LOOKING TOWARD THE LAKE
—From the air by Chicago Aerial Survey Co.

1. Chicago & Northwestern Station.
2. Chicago Union Station.
3. Grand Central Station.
4. La Salle Station.
5. Dearborn Station.
6. Illinois Central Station.
7. Municipal Stadium.
8. Field Museum.
9. City Hall and County Building.

mountains and their extensions. The winning of the West by wagon road, pack horse, waterway and railway was the impulse that stirred the migratory spirit of American youth from Maine to Florida. Horace Greeley's "Go West, young man," was the word passed along from town to hamlet, and it fell on willing ears already ringing with tales of stirring adventure and certain fortune where land was cheap and elbow-room free. Even in the writer's early youth, Daniel Boone's name overshadowed the fame of Washington as a pioneer of the West.

Across the Atlantic, which steam had come to make the great ocean highway, conditions were such that millions needed little urging to take up their belongings and trek to

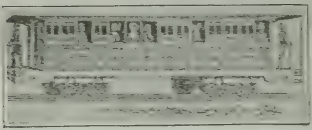
THE FIRST CUNARDER—"BRITANNIA"
First trip, Liverpool to Boston in 1840

the land of liberty and opportunity. The census of 1841 showed Ireland to have a population of 8,196,597. The potato crop failed and by 1851 famine and emigration had reduced the population to 6,574,278. Of the difference, no less than 780,719 are shown by our immigration returns to have migrated to the United States in the ten years 1841-50. This was followed by 914,119 from the Green Isle in the next decade.

Political unrest, ending in revolution in 1849, headed emigration from Germany to the same bourne of free speech and free land, so that before the end of the decade 434,626

German immigrants had sought these shores; only to be followed during the next decade by nearly a million more Teutons, of whom Carl Schurz was the most important acquisition to our public life.

During these two decades immigration added more to our population (4,311,000) than there were inhabitants in the United States at the time of the first census in 1790 (3,929,214) and it was a most fortunate circumstance that canal and railway construction had advanced far enough to assist in their distribution to the broad and fertile plains beyond the Alleghenies.



PASSENGER CAR—MICHIGAN CENTRAL, 1844

The Building of American Railways

Instead of following the fortunes of the many railway projects for opening the various gateways to the West, the reader will be more interested in seeing its development through the eyes of the late Lyman Abbott, who in 1874 contributed a most enlightening description of the making of an American railway to *Harper's New Monthly Magazine.* For the second number of the same magazine, William McLeod had written a lively account of the scenery on the Erie Railroad, some sentences from which may serve as a prelude to Dr. Abbott's more detailed story.

LYMAN ABBOTT—1835-1922.
Latest photograph

"The construction of the Erie Railroad through the hitherto secluded valleys of the Delaware and Susque-

hanna rivers, and reaching now almost to the Allegheny," says Mr. McLeod, "has opened to access new fields for the tourist, abounding with the loveliest and grandest works of Nature. * * *

"The reader is familiar with the geography of the road: Commencing at Piermont on the Hudson, twenty-four miles from New York, on the long pier that projects a mile

VIEW FROM PIERMONT, LOOKING NORTH
First terminal of the Erie on the Hudson, 25 miles from New York

into the river, it winds its way westward among the hills along the course of the Sparkill. Just before leaving the pier, looking north, the view on the preceding page is presented. * * *

"We will present only one other view, which represents one of the imposing structures which characterize the Erie road. This is the viaduct over the valley of the Starrucca, built of stone. It is elevated one hundred feet above the valley, is over twelve hundred feet long and twenty-five feet wide and is composed of eighteen heavy piers, with arches

of fifty feet span. It is simple in its design, but symmetrical and beautiful, and is altogether the noblest piece of work upon the whole line of the road."

Now let Dr. Abbott take up the story twenty-four years later: "I propose," says he in opening his article on "The American Railroad," "to give as far as it can be given within the limits of a single magazine article some account of the origin, history and internal management of the American railroad. * * *

STARRUCCA VALLEY VIADUCT

"It will render our task of tracing the history and describing the organization of the American railroad simpler if we take one as illustrative of the entire system. For that purpose I have chosen the Erie Railway. It is one of the longest, as it is one of the oldest, on the continent. In its early history it met and conquered obstacles which might well have sufficed to crush an enterprise financially much stronger. A large part of its course lay through an absolutely trackless wilderness. To reach its destination it was necessary to climb a mountain range over 1700 feet above the level of the sea, and make its way along the course of a stream which flows

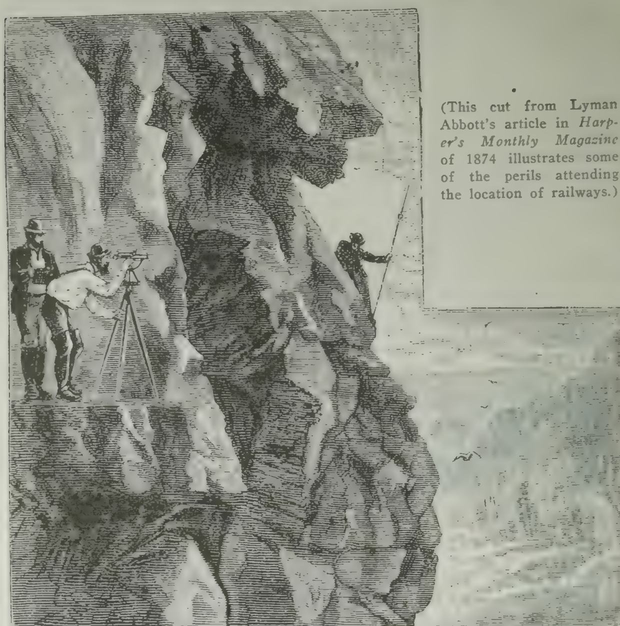
between almost precipitous walls of rock. As a monument of engineering skill it is without a superior today in America—certainly if the times and circumstances in which it was constructed be taken into account. * * *

"The conception of a railroad is often a flash of genius in the individual mind. But before the originator can realize his vision he must succeed in inspiring other minds with his own conception and enthusiasm, and this is always a work of time. Of the prenatal history of the railroad the Erie is an illustrious example.

"In 1779 General James Clinton and General Sullivan, at the close of an expedition against the Iroquois Indians in the southern counties of New York State, proposed to Congress the construction of what they termed an Appian Way from the city of New York to Lake Erie. The great inland seas which we call lakes, and which have done so much to develop the rich but formerly inaccessible West, were at that time separated from the sea coast by the mountain ranges which stretched, with here and there a break, from the Gulf States to the river St. Lawrence. The Great West, the future but then unrecognized granary of the nation, was more remote from the Atlantic than is today the empire of Japan. To the Clintons, New York owes the two great highways which have rendered her chief city the metropolis of the nation—the Erie canal and the Erie Railway. The Appian Way never got further in construction than an ineffectual application to Congress for an appropriation. * * *

"Fifty years passed before the first step was taken toward the realization of this Appian Way. Meanwhile the methods of intercommunication had changed. The canal had supplanted the public road *and the railroad was beginning to supplant the canal.* At last, in April, 1832, three years after George Stephenson ran his first passenger locomotive over the Liverpool & Manchester railway, the Legislature of New York granted a charter for the construction of a road of iron where General James Clinton had dreamed only of one modeled as well as named after the famous highway of ancient Rome. This charter affords a curious illustration of the short-

sightedness that is characteristic of the cunning of politicians. It forbade all connections with Pennsylvania and New Jersey railroads. * * * So the one terminus was made at Piermont, the nearest accessible point in the state on the Hudson river to the city of New York; the other was made at Dun-



(This cut from Lyman Abbott's article in *Harper's Monthly Magazine* of 1874 illustrates some of the perils attending the location of railways.)

TAKING A LEVEL ON THE ERIE IN THE '40s

kirk, the most remote western harbor. But through cars have long since been run direct both to Cincinnati and Chicago; and the long pier that was built over the flats of the Tappan Zee at Piermont to make the steamboat connections with the city is only useful as a permanent warning to legislators that it is their business to facilitate the natural course of trade, not to obstruct, to divert or to control it."

The next step was a survey:

"If the reader will turn to any map of New York state," continues Dr. Abbott, "he will find that the southern tier of counties from the Hudson river as far west as Binghamton, are intersected by mountain ranges, whose abrupt and rugged character and wild and desolate features can be but inadequately indicated. He will see also traced upon the map by insignificant-looking serpentine lines the course of two great rivers, the Delaware and the Susequehanna, whose

TRAINS PASSING THROUGH LANCASTER, PA., ABOUT 1842
Note absence of track elevation or gates for streets in those days

branches are but sixteen miles apart at Deposit, while the waters of the one empty into Delaware Bay and of the other into Chesapeake Bay. These mountain lines indicate the difficulties to be overcome; these river lines indicate the methods by which the railroad engineer overcomes them."

Here follows a detailed description of the route to be taken by the Erie in its journey of 459 miles to its western terminus, to which the writer adds:

"In a somewhat similar way the Pennsylvania Central (Note the Central.) Railroad crosses the same great mountain range by the aid of the Susquehanna, the Juniata and the Conemaugh rivers; and the Pacific Railroad follows the Platte river almost to its source in the Rocky Mountains on the eastern side and descends upon the western slope by the

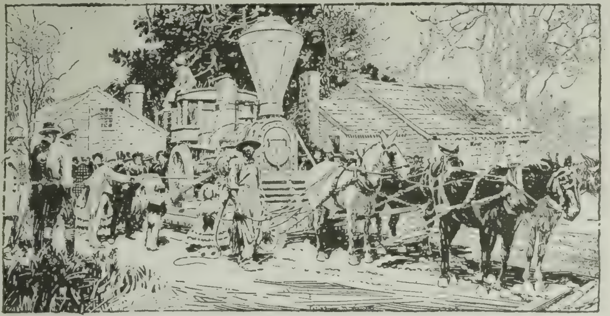
valleys of a succession of less important but equally useful mountain streams."

Then the article takes up the duties of the railroad surveyor, which are common to all railway construction:

"Having made his preliminary and office survey, the real work of the surveyor begins. For this purpose the chief engineer makes a general reconnoissance of the whole ground, generally on horseback. He provides himself with the best map or maps he can obtain. He picks up as best he can more definite and precise local information. To succeed in his work he must have qualities which are rare, qualities which no mere school of engineering can impart. In his profession, as in every other, there is a certain something indefinable in native genius, something which may perish unused for want of development and training but which no mere development and training can supply. The engineer must be a man of ready parts. He must have himself always well in hand. He must know human nature and how to deal with it. He must be equally at home in the log hut among the mountains and in the velvet-carpeted and mahogany-furnished office in the great city. He must be a man of quick eye and abundant resources, able to meet an exigency, or to vary in detail and on the moment a carefully matured plan for the purpose of avoiding an unexpected obstacle or reaching the general result with the least expenditure of time and money. * * *

"The more accurate survey now follows: This is always effected in sections. It is performed by an engineer corps, which consists of an assistant engineer, a transit man, a leveler, a rod-man, two chain-men, one or two flagmen and a gang of axe-men. When the company are obliged to camp out, the necessary accessories of a camp are added. The work of such a surveying party is always, under the best circumstances, one of hardship and adventure. They must stop at no obstacle; and the country presents innumerable difficulties which the map had not reported and even the reconnoissance had not discovered. Morasses are to be traversed, streams are to be crossed, precipitous hills to be climbed, impenetrable thickets to be penetrated. The Erie

Railway runs for miles along the banks of the Delaware river, in many places upon a shelf cut in the solid rock fifty feet or more above the torrent. Yet somehow along this seemingly inaccessible gorge the surveying party had to make their way before the first blast could be fired to prepare the present rocky road-bed. It is said that at some points they were lowered by ropes from the top of the cliff and so, hanging between heaven and earth, took their levels. The earliest surveys of such work as the Pacific Railroad through a coun-



TRANSPORTING A LOCOMOTIVE BY HORSES IN 1842
When the "Florida" arrived in Atlanta it had been hauled from Madison, 60 miles away
—Courtesy of The Right of Way Magazine

try absolutely a wilderness, and almost absolutely an untrodden wilderness, are marvels of human capacity. * * *

"In the railroad survey the exact difference in level must be preserved and respected. Every inequality must be noted. This is done by the leveler and is preserved by the profile map. Of these profile maps there are two—one, the larger map, indicates the general features of the route; the second and more detailed profile preserves to the foot a careful record of every inequality of ground over which the projected route is to pass. These reports indicate exactly the obstacles which the engineer has to encounter. They inevitably lead to new reconnoissances and new surveys. Deviations here and there

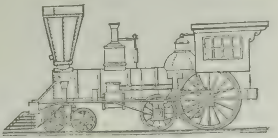
are found to be expedient, to save expense, now in first cost of construction, now in subsequent cost of operating.

"At length the facts are all before the engineer-in-chief, and he is prepared to make his report. It goes before the board of directors. Its conclusions are scanned, its methods cross-examined, its results subjected to the severest scrutiny. A thousand questions must be raised, debated, determined, before anything can be considered settled. The road must deviate here to get the custom of a large town or city, there to avoid grounds through which the right of way would be more costly than a tunnel or filling; now to tap a rival or a cross railroad at the right spot, now to accommodate some wealthy and influential patron, whose interest in the road depends on making it at some point subservient to his own business. If the engineer could only be permitted to run his projected road where it would be easiest built, his problem would be a simple one; but he must also consider what will be the cost of carriage, what will be expensive to maintain as well as to construct, where he will get custom, and how he may avoid local opposition. * * *

"The road is projected; the projector has secured the co-operation of sufficient capital to enable a beginning to be made; it has been surveyed; the right of way has been obtained; a charter has been secured; it now remains to construct the road. In the inception of railroad life this was done by the company. * * * But the growth of railroads has brought with it a division of labor, and now the railroad company rarely or never constructs its own line. This is done for the company by a railroad contractor. * * *

"The railroad contractor is eminently a practical man. He is apt to be a self-made man. He is not infrequently one who commenced life with the spade, the pick-axe and the wheelbarrow. He had greater industry or greater shrewdness than his fellows and became the head of a gang of men. Then he took a small contract on his own account, invested luckily in real estate along the line of a projected railway, amassed a little capital, employed both capital and experience to good advantage, and so gradually got on in the world, till now,

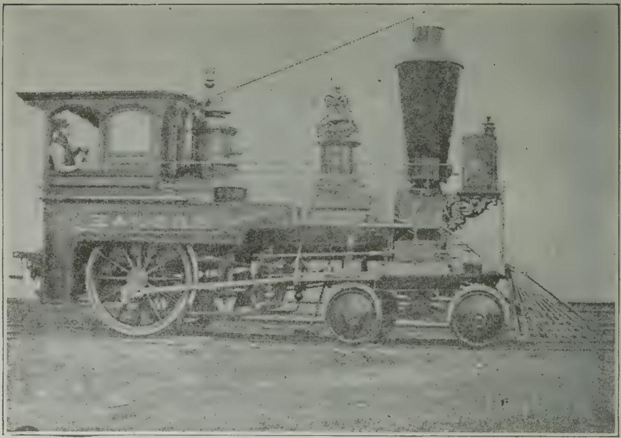
what with capital and credit, he stands ready to undertake any work which the railroad capitalist desires undertaken. He knows how many cubic feet of earth there are in a hill and how many it will take to fill up a valley. He has a practiced eye for soils and detects by a sort of intuition where the hard rock will be, and where the cutting will be an easy one. Earth digging, blasting rocks, pumping, embanking, boring and building tunnels, erecting bridges and culverts, are all familiar operations with him. He possesses a larger or smaller stock of wheelbarrows, picks, shovels, carts, earth wagons, and horses. He lays temporary sleepers and light rails as the work progresses and generally owns at least one or two locomotives and the necessary dirt cars for dragging materials. He usually contracts for a section of the road to be built at a fixed price, or at one that varies within certain limits, according to the development of difficulties as the work progresses. He often sublets to other contractors his work in its details. He sometimes makes a miscalculation and loses a fortune, but his miscalculations are oftener on the credit side of his ledger and the result a fortune made. He has abundant opportunities to make incidental profits, and he is not slow to avail himself of them.



BALDWIN'S FAST PASSENGER ENGINE OF 1848

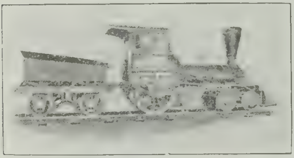
"But he must not only have a practical knowledge of railroad works, he must have a practical skill in managing railroad workers. * * *

"In this country the work of the pick and the barrow is largely performed by Irish laborers. Their temporary villages are familiar to every traveler on our railroads. Their management requires on the part of the contractor peculiar dexterity to avoid the loss inevitable from wasted hours or misapplied energy. In brief, the railroad contractor has under him an army of men without the discipline of an army; he must exercise over them the control of a general without being invested with a general's authority. * * *



THE ENGINE HACKENSACK
Built by Rogers about 1846

"In brief, then, it is the office of the railroad contractor not only to pierce the hills, bridge the streams, cross the valleys, construct the stations; not only must he be a bridge-builder, a road-maker and a practical mechanic; not only must he do his work with ignorant and unskilled workmen * * * but he must do it frequently in the heart of a wild waste wilderness; must transport his men, his tools, his provisions; must erect the shelter and provide the necessaries of life for his workmen; must keep up their failing courage with his own and must do all at the hazard of his purse, if his estimates have deceived him, but at the hazard of his health and even of his life."



THE RECONSTRUCTED "PIONEER" OF THE CHICAGO & NORTH-WESTERN
This 10-ton locomotive was landed in Chicago from a Schooner, October 10, 1848

So Dr. Lyman Abbott, nearly half a century ago, brought his typical American railroad up to the point of

physical construction, ready to be equipped and put in operation. With variations to meet the physical conditions of a continent, the same process of building railroads into the wilderness was proceeding on both sides of the Erie.

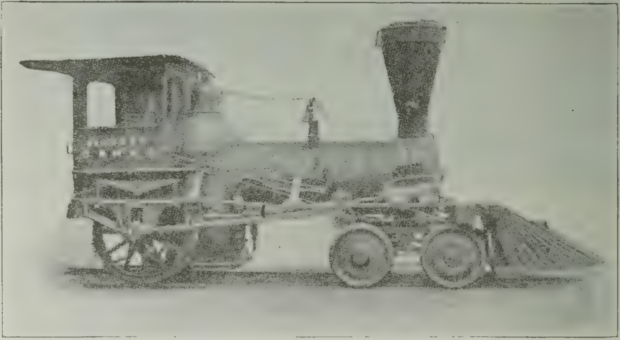
At this stage, five great routes to the West were under construction: the New York-Boston-Albany to Buffalo; the Erie to Dunkirk; the Pennsylvania from Philadelphia to Pittsburgh; the Baltimore & Ohio from Baltimore to Wheeling, and the Southern, Western & Atlantic from Charleston to Chattanooga.

At the end of the decade 1840-1850 we find that the railway mileage of the United States has more than trebled in ten years and is distributed among twenty-five states instead of the nineteen listed in 1840. These twenty-five states, with their mileage and population, were as follows

	Miles in 1840	Miles in 1850	Population in 1850
Alabama	46	75	771,623
Connecticut	102	402	370,792
Delaware	39	39	91,532
Florida	..	21	87,445
Georgia	185	643	906,185
Illinois	..	111	851,470
Indiana	..	228	988,416
Kentucky	28	78	982,405
Louisiana	40	80	517,762
Maine	11	245	583,169
Maryland and D. C.	213	259	583,034
Massachusetts	301	1,035	994,514
Michigan	50	342	397,654
Mississippi	..	75	682,054
New Hampshire	53	467	317,976
New Jersey	186	206	489,555
New York	374	1,361	3,097,394
North Carolina	53	154	869,039
Ohio	30	575	1,980,329
Pennsylvania	754	1,240	2,311,786
Rhode Island	50	68	147,545
South Carolina	137	289	668,507
Vermont	..	290	314,120
Virginia	147	384	1,421,661
Wisconsin	..	20	305,391
Total	2,818	9,021	20,721,358

It will be perceived that the original thirteen states, Maine being included in Massachusetts, contained an overwhelming

majority of railroads—no less than 7,118 miles of the 9,021 miles of completed line being in the section settled before the Revolution. In ten years the population of the United States had increased to 23,191,876, but nearly two and a half million (2,470,518) were living in states or territories without any railway connection with the rest of the Union. But it was coming as swiftly as financial and physical conditions would permit. The coffers of the world were not yet opened

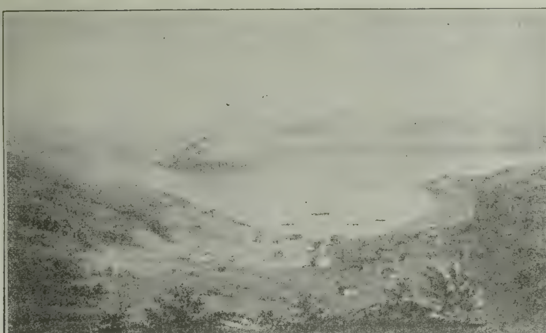


THE "PIONEER"—ANOTHER VIEW

freely to enterprises where the risks were more promising of adventures than of pecuniary returns.

As a glance at the mileage by states indicates, penetration by rail had not penetrated the United States in 1850 anywhere beyond the Mississippi. Even in Illinois, which presented the most inviting topography the eye of a railroad prospector ever rested upon, only 111 miles of line had been constructed of the veritable network then proposed that in a few years was to put it in the van of the railroad procession. In Texas, which has now taken the lead, then freshly admitted to the Union (1845), there was not a single mile of track, and the war with Mexico (1846-48) was prosecuted on land with transportation facilities little in advance of those employed in the earliest campaigns of the Republic.

During this decade the states of Florida, Texas, Iowa and Wisconsin were admitted to the Union; the war with Mexico had resulted in a treaty by which we acquired California and New Mexico by the payment of $15,000,000 to Mexico and $3,500,000 to Americans for damages due to the war. Hardly was the ink dry on this treaty before gold, in quantities that fired the imagination of mankind throughout the world, was discovered in California and the greatest rush of goldseekers



SAN FRANCISCO IN 1848
From a sketch by J. C. Ward

in history taxed to its utmost every known means of transportation across the continent. Immigrants and settlers who had poured into the West from the East and Europe pulled up their stakes and treked across the plains and mountains in caravans by the hundreds. Others went by boat to Aspinwall, made the toilsome portage to Panama, and thence by slow steamer to San Francisco. It would have congested the continental railways and the Panama Canal of 1923 to handle the rush of 1849, but neither was available. In 1848, the same year that gold was discovered in California, the first locomotive was landed from a schooner in Chicago and the latter was the bigger event of the two in its vast potentialities for the human race.

Perhaps the best idea of the lack of transcontinental transportation in those days is given by the fact that the postage on a half ounce letter from San Francisco to the Atlantic coast was 40 cents.

Although mails were first carried by railroads in 1834, and all railroads had been declared post routes in 1839, it was not until March 3, 1845, that postage on letters was reduced to 5 cents within 300 miles and 10 cents for greater distances;

TYPE OF ENGINE BUILT BY ROGERS IN 1848.

and not until 1851 was 3 cents made the rate for carrying a half-ounce letter by mail for any distance under 3,000 miles. Only the railways as developed in the United States and Canada have made the carriage of one-ounce letters all distances on this continent for 2 cents postage possible.

The cost of all railways in the United States up to 1850 was estimated to be $372,770,000, or $34,307 per mile.

Erie 7 per cent bonds sold at $90 cost the company 7.77 per cent interest.

Seven states undertook to build railroads—namely, Pennsylvania, Massachusetts, North Carolina, Georgia, Indiana, Michigan and Illinois. All sold out at a loss. The State of

Pennsylvania built the Allegheny Portage road at a cost of $1,860,750.

The first iron rails imported from England were as durable as modern steel rails, but cost $80 a ton.

The first T-rails were rolled in the United States at the Montour Rolling Mills, Danville, Pa., in October, 1845.

By 1850 there were sixteen steamers plying on the Sacramento, but the Golden Gate had not yet heard the first whistle of a locomotive.

It was during this decade that Gen. John C. Fremont, the Pathfinder, made his famous explorations across the continent that finally landed him at the mouth of the Columbia river and earned for him the Republican party nomination for President in 1856, in the initial campaign that four years later was to culminate in the election of Abraham Lincoln and the great war that followed.

While railway promotion and construction were the great physical concern of this period, over the whole United States the shadow of that great struggle was impending. It had flared up in 1837, when the Rev. Elijah P. Lovejoy was shot while defending his printing press and paper at Alton, Illinois, from an attack of a pro-slavery mob. And from that point on all attempts to avoid, evade or compromise the issue in Congress or throughout the Nation were futile. Only the lack of rapid transportation prevented the extremists of the North and South coming to grips over the slavery question earlier than they did.

CHAPTER IV

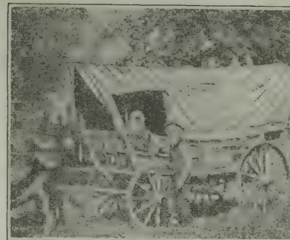
THE THIRD DECADE, 1850 to 1860

We hear the tread of pioneers
  Of nations yet to be,
The first low wash of waves, where soon
  Shall roll a human sea.

—*Whittier*

BY the opening of the next decade, the railways of America may be said to have passed the experimental stage. Their gauge had been fixed by almost universal adoption at 4 feet 8½ inches. The T-rail, which found its prototype in the 550 bars, 15 feet long and weighing 36 lbs. to the yard, imported from England in 1831 for the Camden & Amboy Railroad, had supplanted by practically common consent all other forms of rails. It was laid on wooden cross ties instead of longitudinal sleepers or blocks of stone. With the stone block, its attendant iron chair to hold the rail gave place to the fish-joint held together between fishplates with bolts running through the ends of the rails. The rails themselves had increased in weight to 56 and 60 pounds to the yard— these weights themselves seemingly fixed, the one by halving the British 112-pound hundredweight and the other by arithmetical progression with 10 as the factor. At this stage British nomenclature parted company with the progress of American rail weights which went forward at the rate of 10 lbs. a leap to each yard to reach and pass the 100-pound mark. The length of the rail had also increased from 18 to 30 feet.

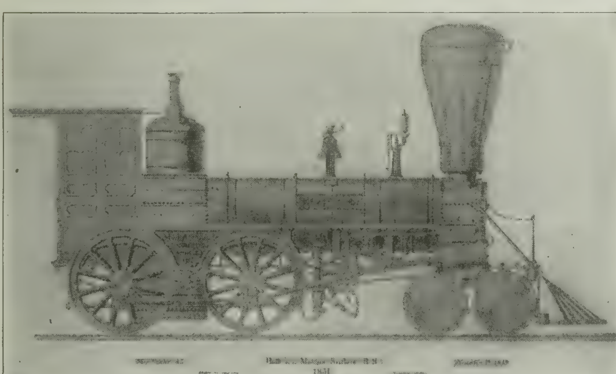
SIR HENRY BESSEMER



"PRAIRIE SCHOONER" OF THE EARLY '50s
No advance on the Conestoga wagon of the '30s

It was during this decade that the first steel rails were imported from England and placed in the line of the Pennsylvania Company. They cost $218 per ton, which may be compared with the pre-war (1914) price of $28 per ton. But the discovery of the Bessemer process, by which steel ingots were manufactured that could be rolled into rails without hammering, in 1855, put an end to such a prohibitive price on steel rails. Sir Henry Bessemer reaped an ample pecuniary reward for his great contribution to the industrial world, but his knighthood was conferred in tardy recognition for an earlier minor invention which the government promptly appropriated without compensation.

In the evolution of the railway the constituent parts of the American train had by this decade reached, in miniature at



"GOVERNOR MARCY," BUILT FOR MICHIGAN SOUTHERN R. R. IN 1851
—Courtesy of American Locomotive Co.

least, the stage familiar to every school child. The locomotive had developed from the nondescript experiments of the earlier days, as illustrated in preceding pages, into what became the peculiarly American type, with its four coupled driving wheels and its four-wheeled truck or bogie, with the pilot or cowcatcher; the large headlight and the wooden cabs with glass windows. The last had been adopted first in New England to protect the engineers from freezing to death at

CROSSING THE PLAINS IN THE LATER '50s

their throttles in the frigid winters north of the Connecticut river. The smokestack had reached the transition stage between the funnel-shaped device with the sparkcatcher, typical of the early wood burners, and the upright stovepipe effect which was to approach the vanishing point, drawn in like a turtle's head, as the boilers assumed greater proportions. At this stage the American locomotive was a gaudy affair caparisoned, so to speak, with shining brass rods which it was the duty if not the pride of the crew to polish up so carefully that thousands of pounds of cotton waste and hundreds of "man-hours" were annually wasted in the useless process. One of the great economic reforms credited to Commodore Vanderbilt was the ordering that all these rods should be painted black, as they are to this day.

The American passenger car of 1850 had assumed the form

and proportion it bears today—a long body mounted on two four-wheeled bogies, first adopted in the United States to permit lengthy engines and cars to round the sharp curves with which our early lines abounded. The side entrance which persists in England and Europe today had been abandoned for the end entrance and the center corridor.

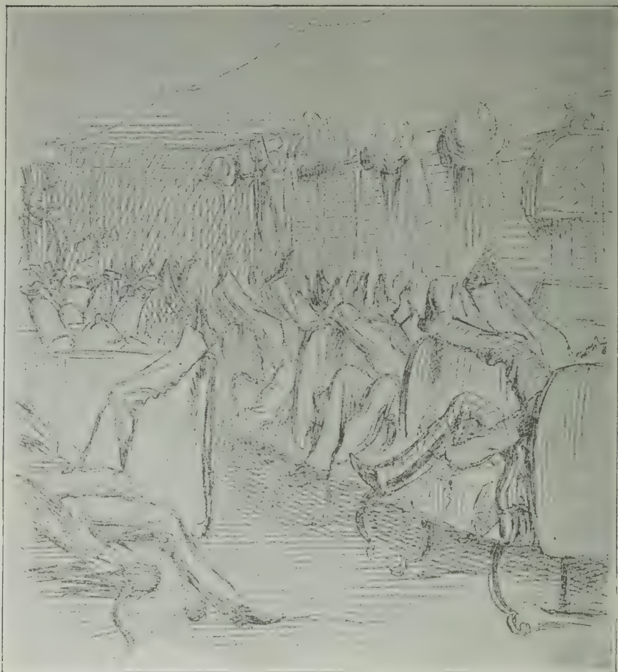
But there is one feature of the modern American through train that was generally missing in the make-up of the trains

"TICKETS PLEASE"—1850
Worse than the owl's midnight hoot to the sleeping passenger.
Note the lantern's sickly illumination.

of the '50s—the sleepers. Not until the average rail journey extended beyond what could be compassed between sun-up and sun-down was there a pressing demand for relief from having to curl up on the length of a single seat. The sketch of "A general view of a night car on the Central" in 1858, from *Harper's Weekly,* represents the ills the traveler of that period had to endure when he undertook to get anywhere beyond Albany after dark and before George M. Pullman drew a curtain over the fantastic scene.

Once more the writer avails himself of the clear view obtained of railway conditions in the United States during the period under review by condensing from a contemporaneous account of a journey over the newly completed Baltimore & Ohio from Baltimore to Wheeling, and thence by boat to Pittsburgh, contributed to *Harper's Monthly* in the spring of 1857, by Brantz Mayer, an American writer of note in those days. The author was fortunate in finding himself a guest on a spe-

cial train made up at Baltimore to carry the officials on a reconnoissance of the road. It was composed of a fine engine, followed by a car fitted up as a kitchen and dining room,



WHERE GEORGE M. PULLMAN GOT HIS INSPIRATION
Discomfort of Night Travel in a day car in the '50s
—From sketch in Harper's Weekly in 1859

where fifteen or twenty could take their meals as comfortably as in the cabin of a packet. Next came two cars with reading rooms, writing tables, books, instruments and everything requisite for the reconnoitering party, while portions were fitted with staterooms for accommodations at night. A car

conveniently fitted up for observation brought up the rear. Being a native of Baltimore of extensive travels, Captain Mayer did not fail to note his appreciation of the admirable "Commissary Department," which had already come to be associated with such inspection tours. The train was scarcely beyond the outskirts of Baltimore before it stopped for breakfast at the Relay House. The fare consisted of Maryland's

ELLICOTT'S MILL—FIFTEEN MILES FROM BALTIMORE

luxuries, "soft shell crabs" and "spring chicken." Skirting the brawling Patapsco, the train quickly passed Ellicott's Mills, famed as the first stop of the initial Baltimore & Ohio train, and soon reached Elysville, where it lingered long enough to permit the artist to make a sketch of the double track iron bridge which spanned the river at that point. Resuming, it was not long before our observer emerged on the Potomac not far from the Point of Rocks. Here the roadway ran along a "ledge cut from the precipice of the Catochin

Mountain, towering up on the right, and supported by broad embanking walls that separate it from the canal and river on the left."

"At this point," says Captain Mayer, "the Potomac is a third of a mile wide, and foams over a bed of ledges like so many fractured barriers, denoting the conflict between the ridge and the river when it burst through the hills. Such, with few intermissions, is the character of scenery from the Point of Rocks to Harper's Ferry, which is built on a narrow declivitous tongue lying directly in the confluence of the Shenandoah and Potomac and was fed on either side by those noble streams."

By the aid of Captain Mayer's lively description and the quaint little woodcuts accompanying the letterpress, the reader gains an impression of the natural obstacles confronted and overcome by the distinguished engineer Benjamin H. Latrobe, under whose inspiring direction the road was completed across the Alleghenies to the Ohio. For a description of the meeting of the rivers at Harper's Ferry, the author has recourse to the well-known passage from Thomas Jefferson, supposed to have been written in the shadow of the giant rock overlooking the scene depicted in the engraving. "You stand," says he, "on a very high point of land; on your right comes up the Shenandoah, having ranged the foot of the mountain a hundred miles to seek a vent; on your left approaches the Potomac in quest of a portage also. In

POINT OF ROCKS
Seventy miles from Baltimore along the Chesapeake & Ohio canal

the moment of their junction they rush together against the mountain, rend it asunder and pass off to the sea."

As the captain's companions wandered through the Na-

EARLY IRON BRIDGE ON THE B. & O., NEAR ELYSVILLE, 21 MILES FROM BALTIMORE

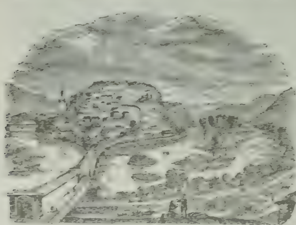
tional Armory at Harper's Ferry, inspecting the preparations made "to construct weapons for human slaughter," he indulged in sentimental reflections regarding the belligerent state of mankind. He had no gift of prescience or prophecy, or he might have recorded some premonitory thoughts of Pottawattamie Brown and the tragic episodes to be enacted only two years later within the shadows of those sentinel mountains. Not a few Americans think that secession was hastened by the Harper's Ferry raid and that the soul of American freedom went marching on to victory from the body of John Brown the fanatical abolitionist.

THE POTOMAC FROM "JEFFERSON'S ROCK"
Harper's Ferry on the B. & O., 81 miles from Baltimore

No such thoughts disturbed the spirits of Captain Mayer

and his companions as their train rolled on into the rugged mountain fastnesses beyond Harper's Ferry. Quickly it panted up the valley of the Potomac, with brief stops at Martinsburg and St. John's Run, to Cumberland. The better part of thirty-six hours had been consumed in making the one hundred and ninety miles now easily run inside of five hours.

Cumberland naturally awakened memories of old Fort Cumberland, famous as a frontier outpost on the Indian trail down the Potomac. It had been the rendezvous for Braddock's ill-fated enterprise and through it passed the National Road. Washington had visited it almost a century before, in 1753-54 and '56, and Captain Mayer has embalmed the general's headquarters in a charming little wood cut given herewith.



HARPER'S FERRY IN 1857
With covered bridge across the Potomac

Leaving Cumberland, the party continued to ascend the chasm and defiles cut by the Potomac in the steep ledges of the mountains towering high above. "No one," says our author, "has ever looked westward from the spot (Piermont) without wondering how the passage is to be effected; yet no one has made the journey without equal surprise at the seeming ease by which science and energy have overcome every impediment. As you pass forward from Piedmont the impression is that you are about to run a tilt against the mountain flank, with blind and aimless impulse; but a graceful curve winds the train out of harm and you move securely into the primeval forest, feeling the engine begin to tug up the steep as it strikes the edge of Savage River, which boils down the western shoulder of Savage Mountain. The transit from the world to the wilderness is instantaneous."

Then the train passes on and up to Altamont, 2,620 feet above tidewater and the greatest elevation along the route. At Cranberry Summit the travelers get the "first grand glimpse of the 'Western World'." And it may be remarked

that Balboa, when he first looked upon the placid horizon of the Pacific, saw nothing grander or more impressive than the scene that unfolds before American travelers as they emerge on the western slope of the Alleghenies.

The journey down to Wheeling and by boat to Pittsburgh need not be told in detail. As he passed through the territory then first reclaimed from Nature, Captain Mayer soliloquized: "In these central solitudes everything seems to be the property of the wilderness—wilderness incapable of yielding to

WASHINGTON'S HEADQUARTERS AT FORT CUMBERLAND

any mastery but that of an engineer; and it may fairly become a matter of *national pride* that scientific men were found in our country bold enough to venture on grades by which any mountain may be passed." The italics are the captain's and suggest the inquiry, how comes it that such slight recognition has been accorded to the race of indomitable engineers who pioneered the winning of our west from the barriers of "absolute mountain, absolute forest and absolute solitude" that less than three-quarters of a century ago this author said separated the East from the West?

When Captain Mayer drove out to Braddock's Battle Field from Pittsburgh he found that a hundred years had obliterated every trace of the conflict. Somewhat in the rear of the central house shown in the sketch, he says, "was the hottest

part of the battle, for ploughmen have found it to be a perfect arsenal of balls, bullets, arrow-heads and hatchets. At present it is waving with grain; through the midst of it the Pennsylvania Railroad has laid its iron track, and the yell of the savage is exchanged for the shriek of the engine."

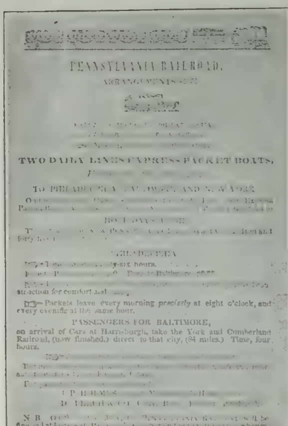
What was to become the Pennsylvania Railroad was opened through all rail from Philadelphia to Pittsburgh in December, 1852.

The Baltimore & Ohio reached Wheeling on the Ohio river January 1, 1854.

The New York, Erie & Western completed its line to Lake Erie on April 22, 1851.

The consolidated lines of the New York Central and Hudson River Railroad finally linked up New York with Buffalo in 1853.

In these four events you have a summary of the master achievements in railway construction on this continent within twenty-five years after the first steam locomotive was built in America.



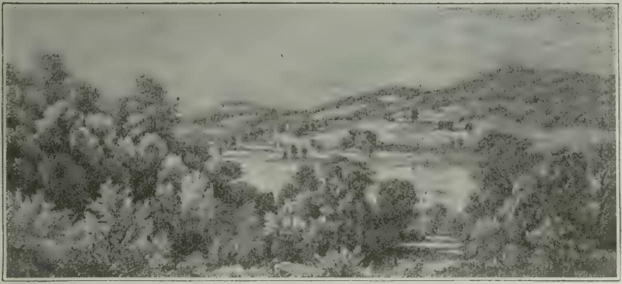
ADVERTISEMENT OF REDUCED TIME—1851
Pittsburgh to Philadelphia, 46 hours
Pittsburgh to Baltimore, 44 hours

While the opening of communication between Philadelphia and Pittsburgh by canal and railway belongs to the preceding decade, the all rail route was left to be completed in that now under discussion.

The rail route consisted of the piecing together of the state owned line from Philadelphia to Columbia; the Harrisburg, Portsmouth, Mt. Joy and Lancaster R. R. from Columbia to Harrisburg; the Pennsylvania R. R. thence to Hollidaysburg, where it linked up with the state owned Portage road with its inclined planes over the Allegheny mountains to

Johnstown and thence to Pittsburgh over the Pennsylvania Railroad.

The reader will remember how, after many vicissitudes, the first horse railroad was pushed through from Philadelphia to Columbia on the Susquehanna. It was not until 1836 that the horse was finally relegated to the stables as the motive power on this incipient trunk line. The reader will also re-



BRADDOCK BATTLE FIELD IN 1857

member how in 1842 the novelist Charles Dickens took the canal boat at Columbia and was wafted, so to speak, at the rate of two miles an hour up the Susquehanna river to the mouth of the Juniata, along which tortuous stream he was carried by boat up into the heart of the Alleghenies at Hollidaysburg. There he was hoisted by five inclines into the rarified mountain atmosphere 2,800 feet above the sea level, to be dropped down to Johnstown on the other side. Thence he took another boat for Pittsburgh.

This afforded a varied and romantic experience in early American travel to the English novelist, but it had its disadvantages, very apparent to the shrewd commercial minds of Philadelphia, who saw that city's interests imperiled by the building of the Baltimore & Ohio to the South and the Erie canal and rail connections reaching out from New York to the great lakes at the north. So along in April, 1846, the Pennsylvania Railroad got a charter to build a railroad from

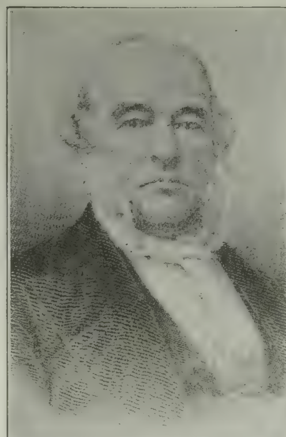
Harrisburg to Pittsburgh, or other place in the county of Allegheny, with authority to extend the road or a branch thereof to Erie, as might be deemed most expedient. The capital of the company was placed at $7,500,000 with the privilege of increasing it to $10,000,000. The charter provided that in case the company should have a certain sum of money in its treasury and fifteen miles of road under construction at each terminus prior to July 30, 1847, the law granting the Baltimore & Ohio a right to build from Cumberland, Maryland, to Pittsburgh should be null and void. These conditions were promptly complied with, to the discomfiture of parties interested in the rival company.

It will be of present interest to recall that the originators of this enterprise took great pains to enlist popular co-operation in their undertaking. Committees went from house to house in Philadelphia canvassing for subscriptions; public meetings were held everywhere; the press was actively favorable to a project that meant so much to the commonwealth, and no stone was left unturned that promised a subscription. The first annual report to the directors records that out of 2,600 subscriptions on the books nearly 1,800 were for five shares or under.

Work was pushed steadily from either end, so that by September, 1850, the line was opened to the Mountain House, near Hollidaysburg, where connection was made with the state owned Portage railroad over the Allegheny mountains. The gap between Johnstown and Pittsburgh was speedily completed and, by using the Portage inclines, cars were run through from Philadelphia to Pittsburgh on December 10, 1850.

In February, 1854, the Pennsylvania Railroad completed its own road over the Allegheny mountains, thus bringing its line from Harrisburg to Pittsburgh into use. It was originally intended to be built as a single track road, but as the work progressed it was deemed advisable to make provision for a second track, and this was laid on the Mountain Division and for considerable stretches on other parts of the line. The cost of the road in 1854, exclusive of equipment, was approxi-

mately $12,700,000, and practically all of this money was raised from the sale of capital stock at par, although a portion of the capital came from loans made in 1852. The outstanding amount of capital stock at par on January 1, 1854, amounted to $11,228,020, on which 6 per cent interest was paid until the payment of dividends began in May, 1856.



J. EDGAR THOMSON—1808-74
President, Pennsylvania—1852-74

But many vexatious matters between the company and the state remained to be adjusted before the road could be cleared for the great part it was destined to play in the settlement of the American transportation problem. The State of Pennsylvania had invested over $33,000,000 in canals and railroads, and that part known as the "Main Line of Public Works" was purchased by the Pennsylvania Railroad in 1857. The cost of the "Main Line" to the State, as reported by the Auditor General in 1843, was as follows:

Columbia Railroad	$ 4,204,969.96
Eastern division of canal	1,736,599.42
Juniata division of canal	3,521,412.21
Portage Railroad	1,828,461.38
Western division of canal	3,069,877.38
Total	$14,361,320.35

In the final adjustment of the differences between the State and the railroad, the latter paid to the State of Pennsylvania $13,570,000.

In this connection it is interesting to recall the hard bargain which the State imposed on the railroad in the nature of a tonnage tax of 5 mills per mile for each ton carried more than 20 miles over the road between March

INTERIOR OF FIRST CLASS PASSENGER COACH, 1852

and December of each year, but not during the winter months, because the State owned canal could not then be operated, and the railroad would not then be competing with the State Line of Public Works. A supplement to the original Act incorporating the Pennsylvania Railroad, provided for the reduction of the tax to 3 mills per ton per mile during the entire year, instead of 5 mills between March and December, and if, after completion of the road, this reduction should not yield as much revenue to the State as the 5-mill rate, the latter was to be restored at the option of the Legislature. Upon its purchase of the Main Line of Public Works in 1857, the Act provided that the Company should be discharged from the payment of this tonnage tax. This Act was declared unconstitutional, with the result that the company found itself in possession of the Public Works, and at the same time burdened with this tonnage tax. The final outcome was the passage of an Act on March 7th, 1861, commuting this tonnage tax provided the

FIRST TRAIN IN MISSISSIPPI VALLEY

Pennsylvania Railroad would pay the State the sum of $460,000 annually until July 31st, 1890. The final cost to the Pennsylvania Railroad, including interest, was approximately $15,500,000.

On to the Mississippi

Having successfully passed the great barrier of mountain ranges that separated the East from the West in the '50s, the promoters of these early railways cast longing eyes on the great plains that stretched invitingly before them. But they found that other railway pioneers had preceded them and covered Ohio, Indiana, Illinois, Michigan and Iowa and the States to the South with a perfect network of projects. Many of these dated back to the preceding decades, only to be abandoned when everything went blue in the financial depression that extended from 1837 to 1844.

So it was that the New York Central interests found the Michigan Central and the Michigan Southern Railroads ready to connect up with their lines at Buffalo for the through routes to Chicago, while several other lines, since consolidated into the Cleveland, Cincinnati, Chicago & St. Louis Railway (Big Four), afforded it direct access to the principal centers of the West.

The Pennsylvania found another group of nascent railroads, none too prosperous, ready for its consolidating hand. These were finally gathered into the Pittsburgh, Fort Wayne & Chicago Railway, which it had helped to promote and finance. Some of the rails which were taken from the State owned Portage Railroad were used on the Fort Wayne road. This furnished a direct route from New York, Philadelphia and Washington to Chicago, and, while the Pittsburgh, Fort Wayne & Chicago Railway was leased to the Pennsylvania for 999 years from 1869, it was some years later before this entire route from New York to Chicago came under direct control of the Pennsylvania Railroad Company. Starting at Pittsburgh from its eastern connection, the Pennsylvania pieced together several lines to which it had rendered financial assistance and by which it reached successively Columbus and

Cincinnati, Ohio, then Indianapolis and Terre Haute, Indiana, and so on to St. Louis.

The Erie, or the New York, Lake Erie & Western, as it was originally called, was stopped in its tracks at Dunkirk by its 6-foot gauge, which was not reduced to 4 feet 8½ inches until 1878. Its story from then on to late in the century was involved in financial shallows and quicksands that have distracted popular attention from its great services to the social and commercial interests of the Union. At this time the Erie had connection out into Ohio over the broad gauged track of the Atlantic & Great Western from Salamanca, N. Y., to Dayton, O.

The Baltimore & Ohio System, after reaching Wheeling, pursued its meandering way across the intervening territory to Chicago on such local stepping stones as the Central Ohio Railroad, the Sandusky, Mansfield & Newark Railroad and the Newark, Somerset & Straitsville Railroad to finally reach its objective under its own name from Chicago Junction, Ohio, to Baltimore Junction, Illinois. From Cumberland its southern branch, via Parkersburg and Cincinnati, reached its objective at St. Louis.

The detail history of the railways through the Central West is a story of faith, hope and disappointment. Their promoters had everything necessary to success—vision, courage, enterprise and energy—but lacked financial resources.

The stringency of funds for railway construction was emphasized and probably tightened by the specter of State regulation that began to hover over all rail projects and heralded its approach by asserting the right to violate the early charters that granted authority to fix rates within certain maxima. In different charters these maxima ran as high as 13 cents a ton mile. The charter of the Petersburg Railroad prohibited charging more than 13 cents per ton mile, that of the Baltimore & Ohio forbade freight charges exceeding 4 cents a ton mile. Between these rates the carriers were permitted to fix almost any rate the traffic would bear and they very generally fixed them low enough to put the canals out of business.

South of the Ohio river the forerunners of the Louisville & Nashville and the Nashville, Chattanooga & St. Louis were feeling their way into the western half of what in the next decade was to be the Southern Confederacy. Railway building throughout the South Atlantic States during this period was fully abreast of that at the North. In 1860 Georgia, with 1,420 miles open, ranked next to Indiana in completed mileage. In that year the completed mile to population was as follows:

	Miles of Railway	Population
Alabama	743	964,201
Arkansas	38	435,450
California	23	379,994
Connecticut	601	460,147
Delaware	127	112,216
Florida	402	140,424
Georgia	1,420	1,057,286
Illinois	2,799	1,711,951
Indiana	2,163	1,350,428
Iowa	655	674,913
Kentucky	534	1,155,684
Louisiana	335	708,002
Maine	472	628,279
Maryland and D. C.	386	762,129
Massachusetts	1,264	1,231,066
Michigan	779	749,113
Mississippi	862	791,305
Missouri	817	1,182,012
New Hampshire	661	326,073
New Jersey	560	672,035
New York	2,682	3,880,735
North Carolina	937	992,622
Ohio	2,946	2,339,511
Pennsylvania	2,598	2,906,215
Rhode Island	108	174,620
South Carolina	973	703,708
Tennessee	1,253	1,109,801
Texas	307	604,215
Vermont	554	315,098
Virginia	1,379	1,596,318
Wisconsin	905	775,881
Total	30,635	29,791,431

Increase, 10 years—239.6 per cent.

The youthful reader cannot fail to note that the general trend of all this early railway construction was westward. Its promoters, engineers and surveyors were followers of the sun. Nevertheless there was one noteworthy exception. From

its first inception the Illinois Central Railway was conceived and designed to be a main traveled railroad running lengthwise from end to end of Illinois. Among the railways contemplated under the State Act of 1837, for which the sum of $11,315,099 was appropriated, the "Central Railroad," as it was named, was projected to traverse Illinois from "the confluence of the Ohio and Mississippi" at Cairo, through the western terminus of the Illinois & Michigan Canal at La Salle to Galena on the Mississippi near the extreme northwest corner of the State. Of the sum mentioned as appropriated, which was for general internal improvements, $3,500,000 was apportioned to the "Central." After $506,000 of this had been expended, mostly on surveys and preliminary work, the plan was abandoned. Several attempts to revive the enterprise made no headway until, in 1851, a charter was granted to a new company to avail itself of the grant of public lands by Congress to the State of Illinois for the building of a railroad from Cairo to Chicago. With this aid and the change in the destination of the road, its construction began in earnest and was prosecuted with such vigor that by 1856 the main line from Cairo to Chicago and from Centralia to Dunleith, opposite Dubuque on the Mississippi, was completed and opened for traffic.

Under the terms of its charter this entitled the railroad company to receive title to some 2,595,000 acres of land along its right of way. This grant was made conditioned on the railway company paying 7 per cent out of its gross earnings from the line built under it in the State into the State Treasury of Illinois, in lieu of other taxes. That provision has proved a most profitable one to the State, which from this source alone has received many times over the value of the lands granted. Up to the end of 1922 this charter tax amounted to $54,380,586, whereas the normal tax covering the same period would not have exceeded $24,000,000. Before the railroad was built the land it received was for the most part unsalable at $1.25 per acre. Within six years of the completion of the road it had disposed of 1,300,000 acres and was offering the remaining 1,200,000 at prices ranging from $6

to $25 per acre. First class farming land at that time was selling at about $10 to $12 an acre. When it is considered that even then the Illinois Central went through such centers as Vandalia, Bloomington, Dixon, Freeport, Mendota, Centralia, Mattoon and Urbana, the price seems almost incredible.

TRAIN ENTERING RANDOLPH STREET STATION OF ILLINOIS CENTRAL RAILROAD IN CHICAGO IN 1857
(See plans for new station in chapter XI.)

If the reader would appreciate the full strategic value of the Illinois Central at the time it was opened, let him study a railway map of the United States of that period. With the extension of the Illinois Central over the New Orleans & Jackson and the Mississippi Central Railways to New Orleans, he will perceive that this road skirted what was then the outskirts of railway construction from the Gulf of Mexico to the northernmost point in Illinois. It is rarely over fifty miles east from the Mississippi, and only in the center of Illinois

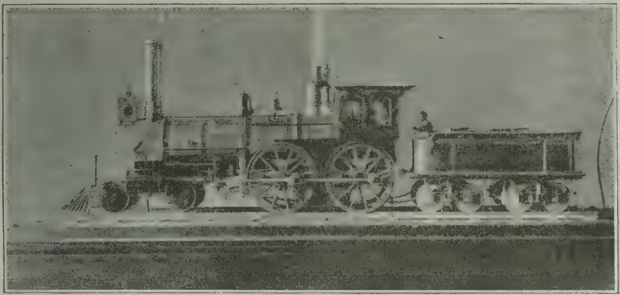
does it wander a hundred miles from the "Father of Waters." Rather, the "Father" does the wandering. Where the river, by reason of its serpentine windings, takes 1,700 miles from Dubuque to the Gulf, the direct rail gets there in 950. This difference alone, if the rail transportation possessed no other advantage, was enough to put the Mississippi out of the carrying business, except for local traffic.

FIRST MICHIGAN CENTRAL TRAIN IN DEARBORN IN 1855
Then a post village ten miles west of Detroit—Now the home town of Henry Ford

Few Tracks West of the Mississippi

In 1860 the steam locomotive had not made its appearance on the far side of the Mississippi at more than half a dozen points. A beginning had been made to connect Vicksburg with Shreveport. There was a short line into Arkansas connecting Memphis with Little Rock. From St. Louis several roads started west, but none of them had reached Kansas City. Des Moines, Iowa, was the center of three "railways in progress" with none completed. Council Bluffs was the objective of a line in the survey stage. Eliminating the four states of Louisiana, Arkansas, Missouri and Iowa, that vast territory west of the Mississippi was without a railway track

except for 23 miles in California and 307 miles in Texas. Disregarding these lonely 330 miles, this meant that more than half (63 per cent) of the land area of the United States only sixty odd years ago was absolutely without the means of the easy transportation that had brought comfort and prosperity to the eastern section of the Union. It is doubtful if there



DANIEL WEBSTER—THE FIRST AMERICAN COAL BURNING LOCOMOTIVE

—Courtesy S. M. Felton, son of the builder.

was a farmer or resident in all that trackless territory who would not have given the shirt off his back to hear those—

Two low whistles quaint and clear,
That was the signal the engineer—
That was the signal Guild, 'tis said—
Gave to his wife at Providence,
As through the sleeping town and thence,
Out in the night,
On to the light,
Down past the farms lying white he sped!

The Land Grant Period

Such was the situation that caused and explained the ready response of Congress and state legislatures to appeals for grants of public lands. The year 1850 was to see the inauguration of a national policy of granting lands in aid of railway construction. The subject had been buffeted about in Congress for a score of years. What between state jealousy, constitutional inhibition, the slavery question and bitter

dissension over the tariff, Congress backed and filled on propositions to give the railways pre-emption rights or outright land grants, and from 1833 to 1850 ended by doing nothing.

Now the need to do something was obvious, if the most necessary of all pending internal improvements was not to fail in its mission of uniting the distant sections of the country in the bonds of commercial, social and industrial union. The separate states had essayed the task of helping to finance these improvements, but the states that needed them most were least able to bear the burden. They could neither build and operate the railways themselves nor back private companies. The result was disastrous, driving some states into insolvency and even to a repudiation of debts so incurred. The canals and post roads in which the states had invested so heavily had been generally obsolete almost before they were open for traffic.

At this time the Federal government was long on land and short on ready cash. The public domain in the '50s has been summarized as follows:

State cessions (acres)	258,504,129
Louisiana purchase, 1803	750,686,855
Florida purchase, 1819	35,264,500
Mexican cession, 1848	329,623,255
Texas purchase, 1850	62,266,953
Gadsden purchase, 1853	29,142,400
Total	1,465,488,092

The Alaskan purchase in 1867 added 369,520,600 acres to this total; but little to its market value, being bought for $7,200,000 cash—that is, 2 cents an acre, which probably fixed the lump sum. In 1850 the Government could not give its land away in wholesale lots at $1.00.

Such was the land situation in the United States in 1850, when Stephen A. Douglas, only recently elected to the Senate, began his successful campaign for the Illinois Central land grant with all the ability and political sagacity of which he was master. A similar bill had passed the Senate in a previous session, and by coupling the Illinois grant with one for a like grant from Alabama and Mississippi to the Mobile &

Ohio the necessary votes were shifted from those states in the South to insure its passage. As this bill set the form for others that followed, its general features may be summarized as applying to all.

The Act of September 20, 1850, granted lands to Illinois for a road from the southern terminus of the Illinois and Michigan canal to a point at or near the junction of the Ohio and

"OREGON OR BUST" WAGON OF THE '50s.
Note the automobile in the background, of which neither man nor quadruped dreamed as they plodded their weary way toward the yellowing sunset

Mississippi rivers with a branch of the same to Chicago on Lake Michigan and another via the town of Galena to Dubuque in the State of Iowa. The main line was to be built within six years. The lands of the road were to be exempt from taxation and in lieu of this 5 per cent of the gross income of the road each year was to be paid into the state treasury. Besides giving a right of way for 100 feet on either side of the road, the bill conveyed to the railway company the alternate even numbered sections of unpre-empted land, within six miles of the road, with a proviso, introduced by Jefferson Davis, then senator, restricting the choice of lands in lieu of pre-empted lands to those within fifteen miles of

the road, for he considered this as far as a loaded team could go and return in a day. The line was to remain a public highway for the use of the Government, and mail was to be transported for such price as Congress might direct. If the road was not completed within ten years, the lands should revert to the Government and the state should pay the United States the amount received from the lands already sold.

The same general features appear in the grants to other states. Subsequently, however, the grants were increased from six to ten miles and the indemnity limits from fifteen to twenty miles. The grants to the Pacific roads, being of lands generally in territories, were made directly to the corporations.

The Illinois Central was completed within the time limit, with the percentage of revenue in lieu of taxes raised to 7 per cent, and under the terms of the Act it received title to 2,595,133 acres. Of this, up to 1895, it had disposed of all but 87,373 acres and had received something over twenty million dollars, or less than $10 an acre. The price fixed in 1856 was from $5 to $25 an acre, on six years' credit with interest at 3 per cent. Deeds were not given until the entire price was paid, so the tax exemption inured to the purchaser for six years.

Besides insuring the prompt building of the road the grant to the Illinois Central accomplished the purpose for which it was made—the sale of the public lands. These were a drug on the market at $1.25 an acre. Coincident with the Act of Congress, the price was advanced to $2.50 and by 1855 all the Government lands were reported as sold. Thus were all the predictions of its advocates fulfilled. Illinois got its central railroad; the Nation its Gulf to Galena connection; the Government got rid of its unsalable lands and the people of the United States secured transportation facilities for which they had been clamoring for a generation. Before the close of the decade, Congress had duplicated its grant to Illinois, Alabama and Mississippi with grants in aid of railways to Missouri, Iowa, Arkansas, Florida, Michigan, Wisconsin, Louisiana, Minnesota, North Dakota and South Dakota. In

almost every instance the conditions of the grants were fulfilled and everywhere the Government and the people reaped benefits far beyond those they bestowed.

Writing on this subject in Bulletin No. 30 of the University of Wisconsin (1899), Professor John Bell Sanborn, to whom I am indebted for much of the foregoing, says:

"These lands have not been the source of wealth to the roads that is commonly supposed. Even in the case of the largest grants the balance for the whole period is quite small and in many cases the land departments are now a source of expense rather than of revenue." The average price obtained was under $10 per acre. "Comparing the building of the roads which received land grants," he continues," with those that did not, it seems that there was no particular need for most of the grants. Unaided roads were built along similar routes even faster than aided ones. The great transcontinental roads, however, probably needed the assistance in the shape of lands or bonds to secure their construction at the time they were built."

Throughout the history of railway building in the United States the brains, the constructive capacity, the untiring energy and resourcefulness, the vision, courage and pertinacity put in their work by the leading spirits of the day counted for far more than anything in the form of appropriations of land or bonds. The land had to be sold for a song and the bonds had to be redeemed.

Abraham Lincoln in Congress and later in the White House never hesitated to lend public assistance to the one medium that promised to unite farm and factory for the common weal. He would have preferred to see the Illinois land grant without the enhancement in price of the land retained, but accepted the principle of Senator Douglas' bill.

Lincoln on Railways and Waterways

It was not in connection with land grants, however, that the Great Emancipator was to make his most noteworthy contribution to railway progress westward across this continent. In June, 1854, a party of 250 excursionists, including

ex-President Fillmore and Charles A. Dana of the New York *Sun* started from Chicago to celebrate the completion of the Chicago & Rock Island Railroad to the Mississippi opposite Davenport. It traveled in two sections and took eighteen hours to cover the distance now easily negotiated in eight. The rails ended at Rock Island on the eastern bank of the

FIRST WOODEN BRIDGE ACROSS THE MISSISSIPPI AT DAVENPORT, IA., 1855

river. It was at that point that the great rivals—railways and waterways—were to come to grips, and the precedence of the rail over the boat for interstate transport was to be demonstrated and decided. In that decision Abraham Lincoln played a leading part.

With the coming of the rails to the river bank, steps were immediately taken to build a bridge across to Rock Island and thence by a longer structure to the Iowa shore. The steamboat interests at once took alarm and invoked the aid of the Secretary of War, who happened to be Jefferson Davis, to withhold permission for bridging navigable waters. Application was made to the Federal Court for an injunction against

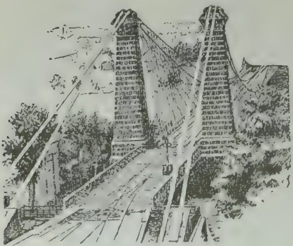
the rail intruders. Justice John McLean of the Supreme Court denied the injunction, the bridge was built, and on April 21st the locomotive named the "Des Moines" crossed to the Iowa shore. "On the following day," says the narrative, "three locomotives coupled together with two tenders and eight passenger cars crossed the new bridge today."

PRESENT STEEL BRIDGE OVER THE MISSISSIPPI (1923)

Fourteen days later the Louisville-New Orleans packet "Effie Alton," sent north from St. Louis, passed through the draw; but 200 feet above the bridge one of her wheels stopped and she was swept against the bridge, took fire, which spread to the span and destroyed it. The owner of the "Effie Alton" brought suit against the Railroad Bridge Company. Mr. Lincoln was employed by the defense and made his memorable argument in which he foresaw the traffic going over the bridge exceeding that passing under it. He urged that the Mississippi, that great channel of trade "extending from where it never freezes to where it never thaws," should not block the travel from East to West which was building up new com-

munities with a rapidity never before seen in the history of the world. "This current of travel," said he, "has its rights as well as that of North and South. If the river had not the advantage in priority and legislation we could enter into free competition with it and we could surpass it."

The jury disagreed and was discharged, but another suit was brought in the Federal District Court for Iowa and the bridge was declared a nuisance and piers lying within the State of Iowa were ordered removed. This decision was reversed on appeal. In its decision the Supreme Court held that according to the assumption of the bill "no lawful bridge could be built across the Mississippi anywhere. Nor could harbors or rivers be improved; nor could the great facilities to commerce, accomplished by the invention of railroads, be made available where great rivers had to be crossed."



FIRST NIAGARA SUSPENSION BRIDGE
Begun in 1852; opened March 8, 1855
(Note the stone towers)

Thus was the wisdom of Abraham Lincoln in favor of the survival of the fittest form of transportation imbedded in the supreme law of the land. The accompanying illustrations show the first bridge across the Mississippi and the present steel structure that has replaced it.

Bridging Niagara

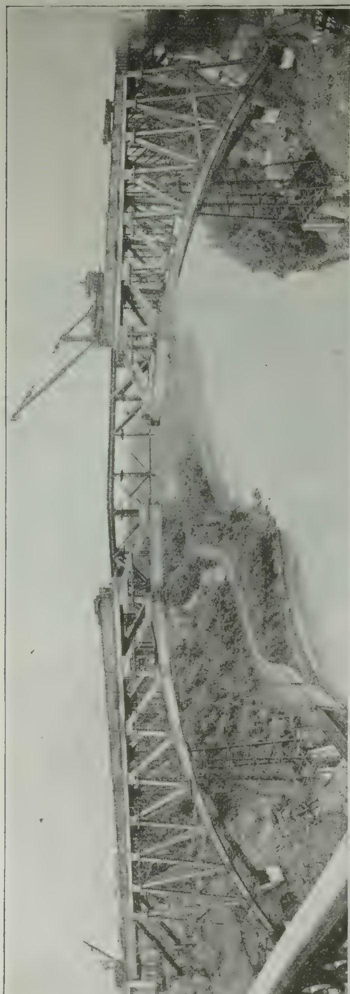
It has been said that there are only three ways of crossing a river—by a bridge, a ferry or a ford. In their progress across the continent the railways have known only the first two, unless the numerous piers in some of the early bridges could be considered as so many stepping stones in the crossing of broad and shallow rivers. Until quite recently the majority of roads entering New York City, or Manhattan as it is now called, did so by ferries from New Jersey, the New York Central controlling the entrance by a bridge over the

Harlem river, or straits as it was originally named. When the railways first reached Buffalo they had the choice to ferry across Niagara river above the Falls or making a detour around Lake Erie by what is now the Lake Shore route. The Canada Southern across the peninsula of Ontario offered a tempting level air line route with a ferry at either end. Plans were immediately adopted to bridge the gorge of Niagara river, and John A. Roebling, the genius of the great Brooklyn

CANTILEVER BRIDGE AT NIAGARA—OPENED IN 1883
Note old suspension bridge in background

bridge, was the engineer employed to draw the plans and execute the work. Construction was begun in 1852 and the bridge was opened for traffic on March 8, 1853. Windsor, on the St. Clair river opposite Detroit, was the western terminus of the road, and trains were shipped bodily across to American soil on large ferry boats. Quite recently the use of ferries has been largely circumvented by a tubular tunnel under the river, made possible by electrical motors. Long before this the Grand Trunk of Canada had tunneled the river at Sarnia.

In the process of development the stone towers of the original suspension bridge at Niagara were replaced by steel



STEEL ARCH SPAN OVER NIAGARA RIVER—1924

skeletons and the chasm was spanned by a new steel cantilever And as this is written these structures have been supplemented by a giant steel arch bridge. The illustrations tell the story of evolution in railway bridges better than columns of technical description.

What the Early Railways Cost

It is very difficult to arrive at a convincing estimate of what it cost to finance, construct and equip the early American railways. From the beginning there was no standard by which to measure the expense. Everything was experimental. The engineer of the period did not know from day to day what new proposition would be sprung on him over night. Not a single through system got

to the end of its proposed route with the same form of structures and equipment with which it started out. Rails, ties, ballast, joints, switches—all underwent a constant and sometimes radical process of evolution. There was no resemblance between the locomotives, passenger cars and freight cars of 1830 and those of 1860. The difference between the 5-ton "Stourbridge Lion" and the 28-ton locomotive that scaled the Alleghenies in the '50s may be said to fairly measure the difference that existed between the rail facilities of the two periods. Everything in between had been discarded and replaced, at constantly increasing cost and in face of recurring financial panics.

It has been estimated that the total investment in the 30,635 miles of line completed in 1860 was $1,150,000,000, or about $37,000 per mile. Railway acccounting was very loose and careless on many of the roads through those constructive days. Uniform accounting was a long way off even after the Civil War. But $37,000 a mile may be accepted as a reasonable average cost in 1860.

For the purpose of subsequent comparison, it may be well to give the following estimated cost of equipment for the Chicago, Milwaukee & St. Paul in 1854:

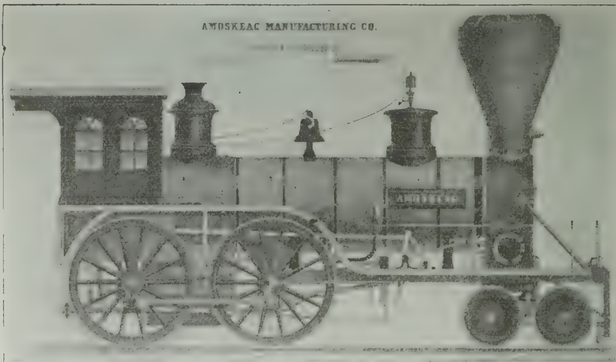
8 locomotives @ $9,000	$ 72,000
8 passenger cars @ $2,100	16,800
4 baggage crs @ $1,600	6,400
70 freight cars @ $1,600	45,500
Platform and gravel cars	25,000
Total	$165,700

As an illustration of how enthusiastic estimates invited well-nigh ruinous results, the case of the Ohio & Mississippi, built in the '50s as an extension of the Baltimore & Ohio, may be cited. A distinguished engineer who was invited to conduct the survey of the line reported that "throughout the entire distance from Cincinnati to St. Louis no grade exceeding forty feet to the mile had been found necessary." He estimated the entire cost of construction and equipment at $6,000,000, which he subsequently revised in detail to $5,045,000. The first contract called for $9,000,000, and before it was completed the cost had risen to $20,000,000, or $58,800

per mile, which had been extracted from different sources with increasing difficulty. But the faithful chronicler of the day concludes:

"Though individuals have lost, the country has gained. The road is worth the money."

It was such experiences as this, running through succes-



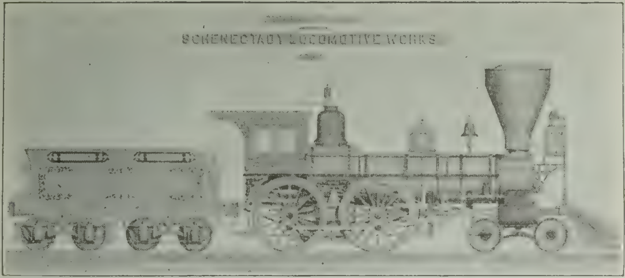
THE AMOSKEAG
A fine model of 1851
—Photo American Locomotive Company

sive reorganizations, that lapped up the millions of water that kept the life in American railways from 1837 to 1860.

St. Paul Sees Visions

In 1853 St. Paul, located on the Mississippi below the falls of St. Anthony, was a thriving town of some 5,000 inhabitants who firmly believed that they held the key to all the vast region north and west of them. In the morning they looked hopefully to the East, impatiently waiting for the completion of the Galena & Chicago Union Railroad to Dubuque. It was already open to Rockford. On this they relied for transportation to Chicago and thence to "New York, Boston and almost any other place you please," as expressed by the historian of that day. In the evening the same inhabitants saw

a vision in the western sky of "the early completion of a railroad from the Mississippi to San Francisco," to quote a writer of that same period, who asserted that he was not dreaming dreams. His vision followed the route of what he termed "the magnificent enterprise of the North Pacific Railroad." With St. Paul as its starting point, it was headed for the



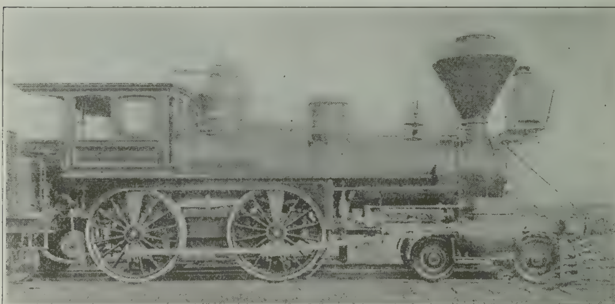
LOCOMOTIVE BUILT FOR THE HUDSON RIVER R. R. IN 1860
(Total weight 108,000 lbs.)
—Courtesy of American Locomotive Co.

great bend of the Missouri river; thence on the table-land between the Missouri and Saskatchewan, searching for some eligible pass in the Rocky mountains; and so on down the Pacific slope to Puget's Sound. The loyal citizen of St. Paul had no hesitation in pronouncing the "Central Pacific Route" impracticable, because, as he said, "the country through which it passes is generally unfit for cultivation; the altitude of the summit is greater; the snows deeper; in brief, that route is out of the question." He was inclined to concede, however, without local jealousy, "that there is a route farther south, through Texas or New Mexico and along the Gila to San Diego or through Walker's Pass to some point farther north" that might be practicable.

There was one fly in the St. Paul cup of optimism that disturbed his dreams. This was nothing less than that his railroad by the northern route might be forestalled by another

railroad, one farther north, that rumor told him the British Government contemplated building north of Lake Superior from Halifax, Nova Scotia, to the Pacific.

The true son of St. Paul also indulged in day dreams of "a continuous line of railroad from New Orleans to the falls of St. Anthony, running on the west side of the Mississippi River through the best portions of Arkansas, Missouri, Iowa and Minnesota." Here he failed to read the handwriting



FAST PASSENGER LOCOMOTIVE, PENNSYLVANIA R. R.—1867
Courtesy Baldwin Locomotive Works

on the wall that had already settled that the connection was to be made east of the Mississippi through a territory already reclaimed from Nature and her waterways by the iron horse.

The effect of such optimistic views as here quoted can be traced in his regretful confession that "In 1849 I could have purchased a quarter of a block, on one lot of which the **Pioneer** office now stands, for two hundred dollars; now (1853) the same property is worth three thousand dollars, without the improvements." The present (1923) value of this block as quoted to the writer is $13,500 exclusive of improvements. That is the transformation the coming of the railway wrought in real estate values in St. Paul; it had even greater effect on the farm values in Minnesota. In 1850 the value of all farm property in the West-North-Central census division, consisting of Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska and Kansas, was $108,885,147; in 1920 the cen-

sus valuation of all farm property in Minnesota alone was $3,787,420,118, or nearly 36 times greater than the valuation of the whole West-North-Central division 70 years before.

The steel rail was the magic wand by which this amazing transformation was brought to pass.

James J. Hill was a farmer lad of 12 in Canada in 1850. He came to the United States in the nick of time to hitch his car to the star of empire sailing west that was to bear him on to fame and fortune. In that same year his precocious rival, Edward H. Harriman, had not attained long trousers.

Railway annalists are prone to dwell upon the financial panics of 1854 and 1857 as the result of the feverish financing of railways into the waste places of the republic. There was undoubtedly an excess of speculative blood in the veins of the American railway promoters of those days. The pioneer spirit refused to be daunted by physical or financial difficulties. Where there was room for population in the uninhabited spaces of the continent he saw visions of farms, villages and towns—all taking on the proportions of metropolitan cities and only awaiting the coming of the railway sidings and terminals. Land and railway speculation went hand in hand to the inevitable fall. Many of the bankrupts of those days needed only to weather the storm of over-construction to have their names enrolled with the empire builders of America.

And they builded better than they claimed. In the five states of Ohio, Indiana, Illinois, Michigan and Wisconsin, where railway construction was most rapid, the value of farms increased from $671,678,075 in 1850 to $1,738,394,188 in 1860, at least one-half of the difference, $1,066,716,113, was attributable to the building of roads that bankrupted their builders. In the same five states during the same period the production of wheat increased nearly 75 per cent and of cattle 60 per cent.

The first really successful locomotive for burning coal in the United States was perfected in 1855. It was named the "Daniel Webster." It ran at half the expense of a wood burner of the same class, which it did not wholly supersede for more than twenty years. The cut on page 123 is from

a photograph of a gold and silver model of the "Webster" presented to the inventor in 1865 and now in the possession of his son, S. M. Felton, president of the Chicago Great Western Railroad. The elder Felton is credited with having frustrated the plot to assassinate Lincoln while on his way to Washington for his first inauguration.

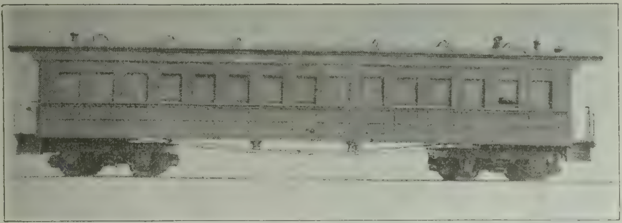
The Coming of the Pullman Palace Car

Toward the close of this decade, through the vision, energy and organizing genius of one man, was to come a departure in passenger car construction destined to place that branch of the service in America in the forefront of railway progress. For a generation little had been done to relieve the long distance traveler from the tedious discomforts of the primitive passenger car. As railway lines extended their tracks farther and farther from the seaboard, these discomforts became a serious check on the naturally nomadic instinct of the average American with a dollar in his pocket. Only immigrants, prospectors and persons traveling on business cared to face a night on an American railway train. The allurements and luxuries of seeing America first were extolled in the advertisements of the time only to suffer disillusionment on the cramped car seats in realization. The steamers on the Hudson and up the Sound from New York were literally floating palaces, with generous staterooms for those who could afford to pay and lesser luxuries, but still convenient, for those with leaner wallets.

G. M. PULLMAN IN 1854

The railway sleeper of the early '50s had not advanced far from the makeshifts of the '30s and '40s. Their builders ap-

parently took canal bunks or shelves for their models. Sometimes narrow mattresses, hardened into something resembling granite from frequent usage, were provided; more seldom an unaired blanket or unlaundered sheet was thrown in and the sleeper used his old-fashioned carpetbag for a pillow.



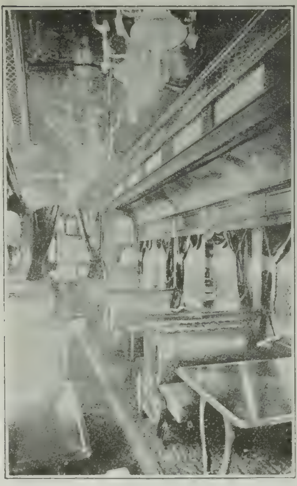
OLD "NO. 9" PULLMAN'S FIRST COMPLETE SLEEPING CAR

When he was about to retire his eye fell on the necessary warning, "Passengers will please remove their boots before getting into the berths." No curtains shut out the fierce publicity that beat upon the occupants of those embryo Pullmans.

Under such conditions a young lad named George M. Pullman took a night train from Buffalo to Westfield, N. Y. The distance was not great, but the discomforts were many and the conveniences, as we know them, nil. Possibly out of the

COSTUME PARTY IN THE ORIGINAL PULLMAN CAR
Note where the Salvation Army lassies got the idea of poke bonnets.

nightmare of that experience he saw visions of the palace sleeping cars and hotels on wheels that were to herald his name to the ends of the earth. He did not linger long behind a country store counter in Westfield, but at the age of seventeen joined an elder brother who was in the cabinet making business in Albion, N. Y. There he acquired the knowledge of woods and woodworking utilized so extensively in his earlier car construction. His first venture in transportation was in contracting to move warehouses and other buildings back from the banks of the Erie canal when it was undergoing one of its periodic widenings. When this was completed, Mr. Pullman, now a young man of twenty-four, moved with his savings to Chicago, where he immediately engaged as a contractor in the great work of elevating the streets some fifteen feet above the level of Lake Michigan. It was thus that by 1858 Mr. Pullman had already acquired the knowledge, experience and organizing ability that was to redound to his fame and the comfort of American railway travel.



INTERIOR OF EARLY DINING CAR

LATEST PULLMAN SLEEPER
Pullman Co. Photo

Rude attempts had been made to build sleeping cars before the first Pullman car was tested on the Chicago & Alton between Bloomington and Chicago. To the Cumberland Valley Railroad of Pennsylvania must be awarded the credit of installing the first sleeping car service between Harrisburg and Chambersburg as early as 1836. It consisted of the adaptation of a second hand day coach to sleeping purposes, being divided into four compartpatrments with three bunks in each, built against one side of the car; a roller towel. basin and water were provided in the rear of the car.

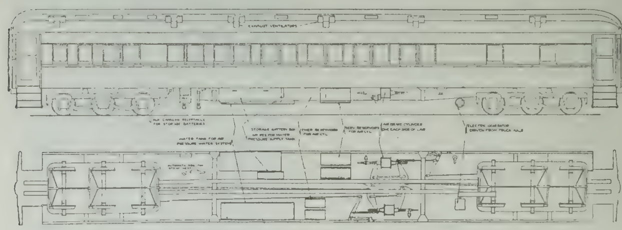
INTERIOR OF EARLY PULLMAN SLEEPER
Note the absence of divisions

Whether Mr. Pullman had ever seen this car or not, its plan of inconveniences had little influence on his first attempt at remodeling two Chicago & Alton coaches into the first Pullman sleepers in 1858. The passenger cars put at his disposal for the experiment in the company's Bloomington shops were forty-four feet long and had flat roofs only six feet from the floor. Into this space he crowded ten sections, a linen closet and two wash-rooms. They were lighted by oil lamps, heated with box stoves and mounted on four-wheel trucks with iron wheels. The reconstruction of these two cars cost less than $1,000 apiece. The chief novelty in them was Mr. Pullman's invention of an upper berth that might be closed up in the day time and serve as a place to store mattresses and blankets.

These experimental cars were a popular success from the start, and after a careful study of their shortcomings Mr. Pullman proceeded to produce the first real Pullman sleeping

car built from the rail up to fill the requirements of long distance travel in America. It was built in a Chicago & Alton shed on the site of the Union Station, now about to be wrecked to make room for the greater Union Station whose completion was delayed by the World War.

Fully equipped, the "Pioneer," as it was appropriately named, cost $20,178—an unheard of price up to that time, when $5,000 was the limit paid for a railway coach. Besides its adaptation to day travel as well as for night journeys, the "Pioneer" differed from preceding passenger coaches in



PULLMAN SLEEPING CAR OUTLINE, SHOWING HOW IT IS SUPPLIED WITH LIGHT, WATER AND HEAT

weight, strength and solidity of construction. It was 54 feet long and 10 feet wide—a foot wider and 30 inches higher than the old car. The additional height was necessary to accommodate the hinged upper berth. These increased dimensions had an important bearing on railway and car construction, for after that all stations and platforms and bridges were built to conform to its standard and the only departure therefrom has been in length.

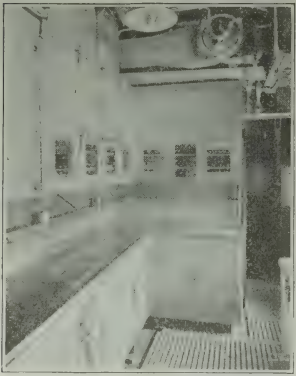
With the solution of the physical phase of the sleeping car problem, the "Pioneer" and its twin, costing $24,000, had to satisfy the doubting Thomases who questioned its superiority justified such expenditure for single cars. Would the public pay for the extra luxury of traveling in the greater safety and comfort of these so-called palace cars? Mr. Pullman proposed that the public that paid should decide. The Chicago-Springfield train was equipped with both styles of

cars, Pullmans to charge $2 a night, the old style sleepers $1.50. The result justified Mr. Pullman's confidence that the public would pay a bonus for the best. The Pullmans carried all they could hold, the old style only those who could not get sleeping room in the new style. In a short time the $1.50 sleepers were withdrawn, leaving the sleeper field to the $2 car and its colored porter. By 1867, when the Pullman Palace Car Company was incorporated, Mr. Pullman owned all the sleeping cars on the Chicago & Alton, the Chicago, Burlington & Quincy, the Michigan Central, the Great Western of Canada and the New York Central Lines— a total of 48 cars. That incorporation was to bear fruits no whit less important than his original invention. It established a system whereby the best equipment for both night and day railway journeys was placed at the service of the public over all the railways, without change at connecting points Besides being a wonderful convenience, this corporation had a great part in hastening the final adoption by all of our railways of the standard 4-ft. 8½-in. gauge.

PROCESS OF MAKING UP BERTHS IN MODERN PULLMAN SLEEPER (1924)

INTERIOR OF MODERN DINING CAR
Mark the simplicity of design

In the same year the Pull-



SECTION OF MODERN DINING CAR KITCHEN
Built by Pullman Company for Chicago, Burlington & Quincy R. R. in 1924

man Company built and put the first "hotel car" in service on the Great Western of Canada. This car, which was the predecessor of the dining car of today, was in reality a combination of a sleeping car with a kitchen at one end. The meals were served at temporary tables between the sections, as is still the case on some roads, both in Canada and the United States.

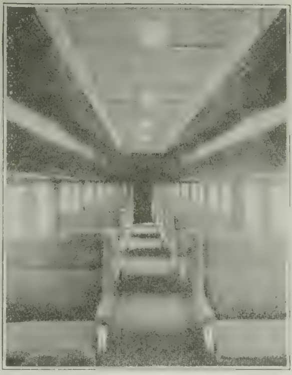
The dining car, appropriately named "Delmonico's," devoted wholly to eating purposes, was personally designed by Mr. Pullman in 1868 and, like his first sleeping cars, had its initial trip on the Chicago & Alton.

In May, 1870, the first through train of Pullmans from the Atlantic to the Pacific carried a distinguish company of Bostonians from Boston to San Francisco in an excursion of the Boston Board of Trade.

VIEW OF OTHER END OF PULLMAN DINING CAR KITCHEN

From that time to the present the progress of the Pullman car has been one of continuous development along the lines of safety, simplicity, convenience and cleanliness. Few persons traveling in these cars realize at what an expenditure of thought, vigilance and money the Pullman standard of

cleanliness is maintained. To provide the mere facilities for car cleaning alone the company maintains a force in 225 principal and 150 outlying yards. In these are employed a staff of over 4,000 cleaners. The company keeps constantly on hand no less than 1,858,178 sheets, valued at nearly a million dollars. During one year over 100,000,000 pieces of linen, including sheets and pillow cases, were washed and ironed. All told, the Pullman Company has an investment of nearly $2,000,000 for approximately 7,000,000 separate pieces. Replacement alone costs over $400,000 a year.



INTERIOR OF LATEST PULLMAN SLEEPER, 1924

But the Pullman Company has not achieved its monopoly without competition and rivalry and does not maintain it without constant superiority of service.

Among its earliest competitors was the Mann "Boudoir Car," in which the beds were arranged transversely instead of longitudinally. This car met with a very favorable reception in Europe, where its general features survive to this day. It was put in service in the United States in 1883 between Boston and New York. The cars were divided into eight compartments, accommodating two or four persons. It was tried on a few western roads, but never met with public favor. Having a smaller seating capacity necessitated a higher fare, which did not conduce to its success.

The most serious competition encountered was that of the Gates Sleeping Car Company, named after its promoter, G. B. Gates, general manager of the Lake Shore road. It was absorbed by the Wagner Palace Car Compay in 1869. Backed by Commodore Vanderbilt, the Wagner Company, whose cars resembled closely the Pullman characteristics, was able

to place its cars on the New York Central and its connections. In 1881, the Pullman Company brought suit for infringements of its patents against the New York Sleeping Car Company and Webster Wagner, claiming $1,000,000 damages. The suit was compromised on the Wagner Company agreeing to use the Pullman improvements under contract to run its cars only on the New York Central road.

GEORGE M. PULLMAN'S HAPPIEST PHOTOGRAGH
(Courtesy of his daughter, Mrs. Frank O. Lowden.

The rivalry between these two companies came to a show-down over the use of vestibules between cars, which Mr. Pullman put in operation in 1888. The Wagner Company promptly advestised a vestibule train and was as promptly met with an injunction holding the Wagner devices an infringement of Pullman patents. After protracted hearings the case was determined in favor of the Pullman Company.

The so-called "Sessions patent," under which the Pullman Company operated, was patented in 1881 and covered the principles upon which the vestibuled train is operated to this day. As originally designed the accordion diaphragms were only the width of the passageway between the cars. As redesigned in 1893 they enclosed the entire platform by means of a drop which lowered over the step openings. Among other advantages the vestibule added greatly to the steadiness and cleanliness of the entire train. The rivalry between these companies ended with the absorption of the junior by the senior organization, greatly to the improvement of the service.

The manufacturing side of the Pullman Company is another story, having been separated from the parent company in 1924.

CHAPTER V

FOURTH DECADE—1860—1870

Railroads in the Civil War—Then the Union Pacific

Hark, I hear the tramp of thousands
  And of armèd men the hum;
Lo! a nation's hosts have gathered
  'Round the quick alarming drum,—
    Saying, "Come,
    Freemen, come!
Ere your heritage is wasted," said the quick
  alarming drum.

—Bret Harte.

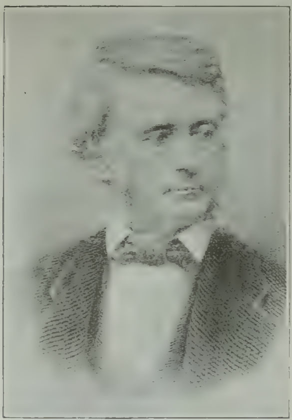
Lincoln was inaugurated March 4, 1861. Sumter was fired on April 12, 1861.

NO existing general history of the United States does full justice to the part played by the railroads from 1861 to 1865 in the preservation of the Union from the disintegrating convulsion of secession. Viewed from an impartial standpoint, the railways of the South served their section with characteristic American devotion and courage. Operating on interior lines from Mason and Dixon's line to the Gulf, they served General Lee with untiring zeal and loyalty. With constantly shrinking facilities and equipment, they eked out dwindling resources of men, materials and supplies to the bitter end at Appomatox, and then, like the sol-

ABRAHAM LINCOLN
Who Approved the Location of the Union Pacific in 1864.

diers of the Confederacy, the railroad men started the rehabilitation of their lines from Richmond to Galveston

Lee's surrender came through no fault of the railways of the South nor by any superiority of patriotism in the railways of the North. It followed in due course of cause and effect from the impetus given to settlement and production by the rapid laying of rails west of the Alleghenies that took place from 1850 to 1860. When the railways finally broke through the barrier mountains in the early '50s, the territories to the west of Pittsburgh and north of the Ohio had a population of only 4,840,822 and that vast region could boast only 1,276 miles of rail communication. Before Sumter was fired on this same territory had a hardy pioneer population of 8,282,750, brought in touch with the outposts of the Confederacy by no less than 10,285 miles of line, which was being added to every day.

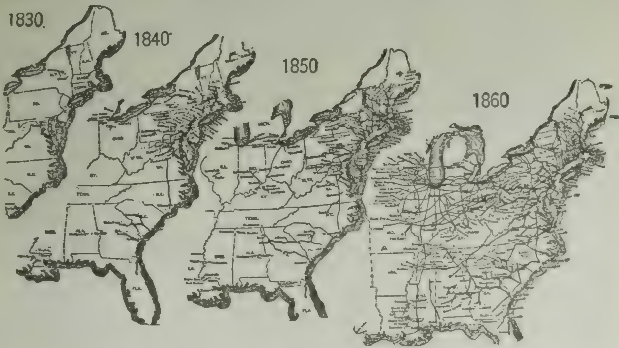


THOMAS A. SCOTT, 1824-81

To realize what these figures mean it is well to remember that the South entered upon the conflict with a population of 12,127,067 and 10,386 miles of railway, not all of which was available for the struggle. Fully one-third of the population was colored, and not all of the railway mileage was in states in active rebellion. So far as breaking up the Union by force of arms was concerned, the attempt came fully a decade too late. It is not impossible, nor wholly improbable, that it might have suc-

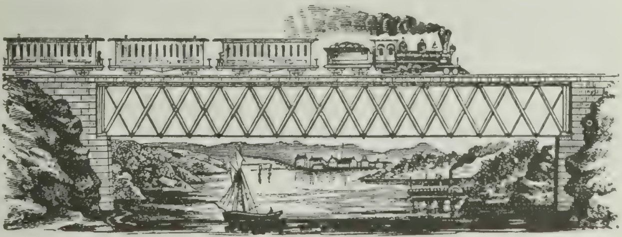
A SOUTHERN ENGINE OF THE '60s.

ceeded in 1850, when over 40 per cent of the Nation's inhabitants formed a truly "solid South" and the opposing 60 per cent was scattered from Skowhegan, Maine, to the Mississippi, with no completed means of transportation at either



MAPS SHOWING MARCH OF RAILWAYS—1830-1860

end. By 1860 the gaps in the North were bridged with steel and the recruit from Skowhegan, as from LaCrosse, Wisconsin, could be carried by rail to any point along the long front from the Mississippi to Chesapeake Bay. It may have been true, as the fighting Southerner claimed, that he was individually more than a match for the Northeastern Yankee But in the great contest he found that Yankee reinforced with



BRIDGE, TRAIN, STEAMBOAT AND WOODED LANDSCAPE—1860.

a new generation bred in the open air west of the mountains that scorned fatigue and made a jest of danger.

It was the West that won the war for the North, and it was the railways that settled the West and carried its sons on to Vicksburg; to the base of Lookout Mountain; and united the West and the East in the day of final victory. The West gave Lincoln to the Nation and Grant to the Union army at

BALDWIN ENGINE, BUILT IN 1861

Vicksburg and in the Wilderness campaign. They had no prototypes, so far as human ken could discern in 1850, when Fillmore was president and Jefferson Davis was a power in the United States Senate.

Speculation as to what might have been but for the amazing development of the West in 1850-1860, however interesting, cannot be conclusive. All we know is that the railways furnished the means by which the response of the West to the Union call, "Lord, we come!" was made effective as it was practically unanimous.

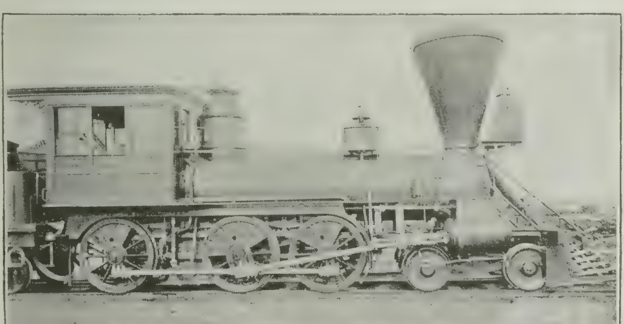
What One Railway Official Did

It would take a separate volume to tell the exploits of individual railway men on both sides of the line during the war. Their experience and trained services were in demand from Washington to Texas in the movement of troops and

munitions. They headed construction and reconstruction gangs all along the frontier as the tide of conflict flowed backward and forward through those four fateful years. One day they tore up miles of track to impede the adversaries' advance, only to see it restored the next day as if by magic by the enemy, who was equally quick to put it out of business when the tide of combat turned.

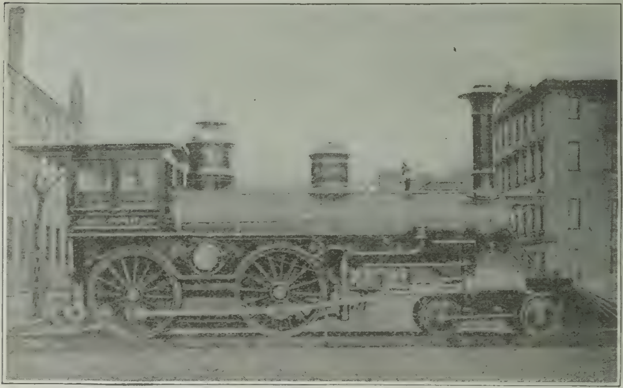
The one railroad man who impressed his personality high up on the Union side of the line was Thomas A. Scott. He began his career with the Pennsylvania Railroad as station agent at Duncansville in 1850 and in ten years, by dint of unusual executive ability and energy, rose to be vice-president under the direction of the road's famous executive J. Edgar Thomson. Here the war found him, and Governor Curtin of Pennsylvania summoned him to his aid to place him in charge of the transportation of the state's troops answering by thousands to President Lincoln's first call. So perfectly did he organize the service that it attracted attention in Washington, and when Southern sympathizers in Baltimore burned

THOMAS A. SCOTT
As he looked during the war period



TYPICAL BALDWIN LOCOMOTIVE OF 1861
Built for the Pennsylvania Railroad

the bridges of the Northern Central Railroad he was called to the National capital to superintend and keep open the road from Baltimore to Harrisburg. On April 27th Mr. Scott was appointed to take charge of the railways and telegraphs between Washington and Annapolis, and, as his work involved acting in a military capacity, on May 3, 1861, he was mustered into the service as colonel of the United States volunteers. His first duty was to construct a line by way of Annapolis to



BALDWIN PASSENGER AND FREIGHT LOCOMOTIVE
Built for the Philadelphia, Wilmington and Baltimore R. R. in 1862

Philadelphia to replace the Northern Central connection which had been destroyed. It was a case that admitted of no delay—where what had to be done was done so quickly that the officials who ordered it done did not know when it was done. President Lincoln was one of these to whom the immediate opening of the new line meant so much. Meeting Colonel Scott, he asked him how the work progressed.

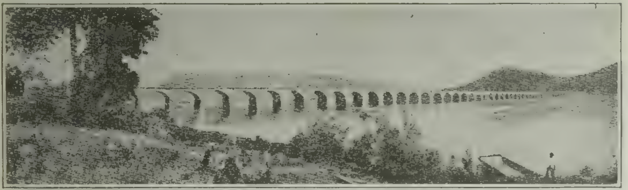
"The road is completed," replied the colonel.

"Completed!" echoed the amazed President. "And when may we expect troops over it?"

"A train is already in with a regiment," responded the colonel, "and others are on the way."

"Then, thank God! we are all right again!" exclaimed Mr. Lincoln. As a result of Colonel Scott's promptness there were fewer sleepless eyes in Washington that night.

Before the close of the month Colonel Scott was appointed "to take charge of all Government railways and telegraphs or those appropriated for the Government," and on August 1, 1861, he was appointed assistant secretary of war, a post created for him. In this position he was required to visit all the great western states to organize their means of transportation to expedite the preparation and movement of their



STONE BRIDGE OVER THE SUSQUEHANNA
At Rockville, Pa., replacing iron truss bridge built in 1877, after previous wooden truss partially destroyed by fire in 1868.

volunteers for actual service. In the performance of this duty alone Colonel Scott traveled some 5,000 miles.

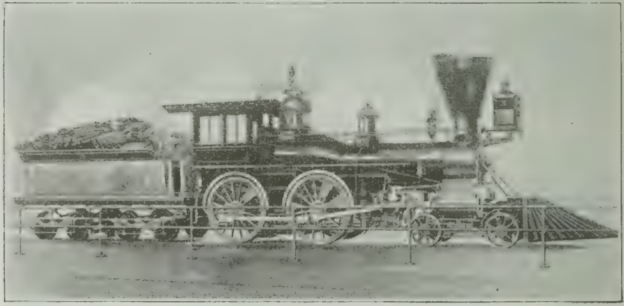
In June, 1862, Colonel Scott resigned his Federal position to resume his duties as an official of the Pennsylvania Railroad, only to be recalled by Secretary Stanton to report to General Hooker for "special service" on his staff. This special service was nothing less than "the duty of sending forward with the utmost despatch the troops of General Hooker's command." It consisted in forwarding Hooker's and Howard's corps over railroads connected by improvised tracks, so that in an incredibly short time he had assembled from half a dozen different states an army of fifty thousand men, with their artillery, cavalry and complete field equipment "where it was most needed." The special order for utmost despatch, with its appointment as assistant quartermaster of volunteers, was issued from Washington Septem-

ber 24, 1863; Colonel Scott furnished the necessary despatch so that on November 24th Hooker was able to win the "Battle Above the Clouds" on Lookout Mountain, and on the following day the Federal army under Grant scaled Missionary Ridge, and the siege of Chattanooga was raised.

With this signal service successfully performed, Colonel Scott once more resigned his military title to resume his position as active vice-president of the Pennsylvania. Such special service as Colonel Scott was in a position to render to the Union cause was duplicated in other fields by thousands of railway men wearing the blue and gray as their fealty to state or nation called and as opportunity arose. The decisive preponderance of duty as of service was settled for the nation by the railroad building of 1850-1860.

Story of a Confederate Locomotive

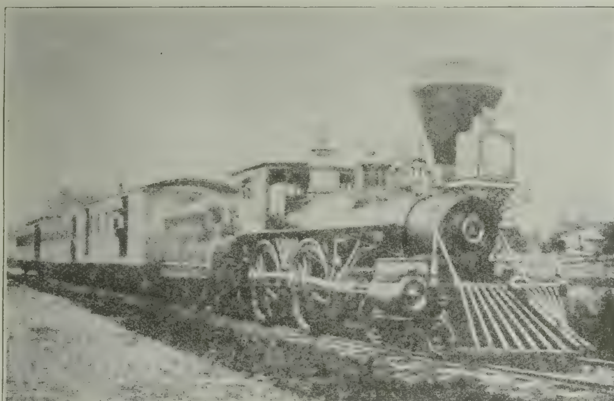
How these respective senses of duty came into sharp and unusual conflict may be illustrated by the story of the seizure



THE FAMOUS LOCOMOTIVE "GENERAL"
As It Appears in the Union Station at Chattanooga, Tenn.
Its Seizure by the "Andrews Raiders" and Pursuit by the Confederate Crew is One of the Most Thrilling Railway Stories of the Civil War

and recapture of the famous locomotive "General," which ever since the war has been an object of interest to all travelers having occasion to stop off at Chattanooga. On the morning of April 12, 1862, a passenger train on the Western

& Atlantic, now a division of the Nashville, Chattanooga & St. Louis Railway, under charge of Capt. W. A. Fuller, left Atlanta for Chattanooga. At Marietta a party of strangers in plain clothes got on board and paid their fares to different points. They claimed to be refugees from the Yankee lines going to join the Confederate army. In fact they were disguised soldiers, volunteers from Sills' brigade, U. S. A., led by a Kentuckian named James J. Andrews.



PASSENGER TRAIN OF 1860 WITH WOOD-BURNING LOCOMOTIVE, DELAWARE & HUDSON CO.

At Big Sandy, seven miles from Marietta, the train stopped for breakfast and most of the passengers and crew left the train. No sooner had they taken their seats than Captain Fuller, looking through a window, saw a body of strangers mount the engine and start off rapidly with three freight cars detached from the passenger train. Then began as exciting a chase as was ever witnessed in peace or war. Captain Fuller, his engineer, Jeff Cain, and Anthony Murphy, the foreman of the Western & Atlantic shops, started the pursuit on foot, just as the "General" and its crew of raiders, at first mistaken for Confederate deserters, was disappearing around

the first bend in the track. At Moon's station, two miles from Big Sandy, Captain Fuller got news of the fugitives that satisfied him they were Federals in disguise, and this added greater zest to the pursuit. With the aid of track hands, he placed a hand car on the rails and with his two companions literally pushed the pursuit, taking turns, two running and pushing while the third rested. Now and then they had to stop to remove obstructions which the flying Federals threw upon the track. At Acworth they secured some guns and were joined by two men, who aided greatly in the chase. Two miles from Etowah the crew of the "General" stopped long enough to take up two rails from the outside of a short curve, and the handcar and its crew were ditched.

At Etowah Captain Fuller found an old engine named the "Yonah," which proved to be a better friend than its name suggested. Some time was lost attaching the engine to its tender and a coal car for the use of a number of Confederate soldiers who volunteered for the grim frolic. From Etowah to Kingston the "Yonah" was forced up to sixty miles an hour only to find at the latter station that the "General" was maintaining its lead. Here the "Yonah" was exchanged for another engine named "Texas," which, with one car, was pressed into the service. From Kingston the pursuit was much impeded by cross ties dropped from the rear car of the "General's" train. A short distance from Adairsville, which is 40 miles from Big Sandy, the "Yankees" had stopped long enough to tear up 60 yards of track.

Nothing daunted, Captain Fuller continued the chase on foot and soon outran all of his company except Anthony Murphy. Two miles from Adairsville he was met by an express freight of twenty cars. At his signal it stopped; and under his orders it began to back in the direction whence it came, with Captain Fuller on the rear car. As it approached the switch at Adairsville in this fashion he jumped off, ran ahead and changed the switch so as to throw the cars on the side track. This accomplished, he changed the switch back to the main track and jumped on the engine, which had been un-

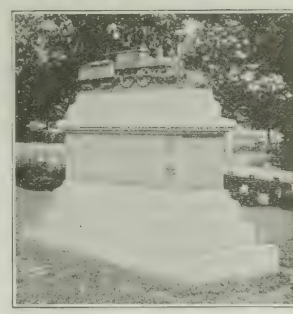
coupled from the cars. This was achieved "so adroitly that the train and engine ran side by side for fully three hundred yards."

The captain's command had now been reduced to himself, Murphy and the engineer, fireman and woodpasser. They backed the next ten miles to Calhoun in twelve minutes, which was some speed for an engine with 5-foot 10-inch driving wheels.

As they passed Calhoun at fifteen miles an hour the captain added to his crew by landing a boy telegrapher on board with a flying grasp of the hand. This lad had walked from Dalton looking for the break in the wire which the Yankees had cut.

Fuller's game now was to reach Dalton before the fugitives could cut the wire between that station and Chattanooga.

Two miles from Calhoun the crews of the rival engines caught sight of each other. Those on the quarry promptly let loose a freight car to block the road. But that did not deter Captain Fuller long. He coupled it to his engine and from its top gave the necessary signals to the engineer. Then the "General" detached another freight car, which the captain's engine as promptly coupled up.



"GENERAL" MONUMENT
In the National Cemetery on Lookout Mountain, Erected by the Survivors of the Raid.

At Resaca, five miles from Calhoun, the captain was able to get rid of his two impediments and started again with an engine only. Two miles north of Resaca a T-rail was discovered diagonally across the track, too late to stop. Then the captain made the important discovery that his engine at fifty-five miles an hour was a steeple-chaser, for it went over the obstruction like a trained hurdler. At Dalton the telegraph

boy was dropped, with orders to dispatch instantly a telegram, which Captain Fuller had prepared, to General Ledbetter at Chattanooga, informing him of the situation and warning him not to let the raiders pass.

Two miles beyond Dalton the pursuers came in sight of the fugitives again. They had stopped to tear up the track and cut the wire. This last cut was just too late to catch the message to General Ledbetter, but it intercepted the usual acknowledgment.

The race was now resumed at a hotter pace than ever, but with the "General" showing signs of distress.

Half way between Ringgold and Graysville the fugitives abandoned the "General" and took to the woods, with the injunction from their leader, Andrews, that "every one take care of himself." They scattered in groups of three or four. Captain Fuller secured the aid of a company of mounted militia and began to scour the woods for the fugitives. Four of these were run down in the fork of the Chickamauga river at Graysville. In a few days all were captured and for the first time it was definitely known that the raiders consisted of twenty-two men, two of whom, including the leader, Andrews, were Kentuckians and the other twenty were enlisted men attached to the 2d, 21st and 33d Ohio infantry. Tried by court martial, eight of them, including the two from Kentucky, were executed in Atlanta as spies, six were exchanged and eight escaped from prison at Atlanta. "Thus," concludes the historian, "ended one of the most daring exploits on record."

The story, however, does not end there. The "General" was to see further service. It hauled a train load of ammunition up to General Johnston's lines in the battle of Kenesaw Mountain on the morning of June 27, 1864; and in the evening brought a large number of wounded soldiers from Featherstone's division back to Marietta. It was also the last Western & Atlantic engine to leave Atlanta with a train load of refugees and war material when Hood's army evacuated that city.

The United States recognized the daring exploit of its soldiers by awarding medals of honor to the six men who were paroled as well as the eight who escaped from the Atlanta prison. Medals were also ordered for the nearest relatives of the men who were executed.

The fame of this exploit is kept alive in Chattanooga by the preservation of the "General" inside a guard rail at the station, with her tender heaped with firewood as when she started on her unscheduled flight from Big Sandy; and high up in the National Cemetery on Lookout Mountain the survivors of the raiders have erected a monument to their fallen comrades. The monument is surmounted by a miniature of the "General", and tablets on three sides of the pedestal bear the names of the three parties into which the raiders were divided—the executed, the paroled and the escaped prisoners.

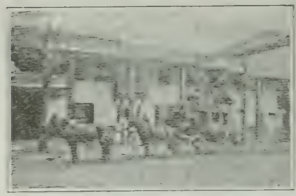
This tale serves to illustrate one phase of railroading during the Civil War in which the wits, resourcefulness and daredevil spirit of both armies were matched with varying fortunes.

According to Prof. Carl Russell Fish of the University of Wisconsin, the skeleton of the Southern railway system had been planned with remarkable foresight and was almost complete when the war broke out. It furnished transportation for men, munitions and provender from the limits of the Confederacy to Lee's army over rails five feet apart, the gauge being a constant impediment to the use of northern rolling stock. "As the northern armies threatened to advance," says Prof. Fish, "the Confederate military authorities, after running off the rolling stock, destroyed as much of the permanent way as they knew how. They never, however, acquired the skill in this art of the more mechanically minded northern soldiers."

In his personal memoirs General Grant tells how expert Sherman's men became in this work of hobbling southern communications. "The method adopted," he says, "of crippling these roads was to burn and destroy all the bridges and culverts, and for a long distance, at places, to tear up the

track and bend the rails. Soldiers to do this rapidly would form a line along one side of the road with crowbars and poles, place these under the rails and, hoisting all at once, turn over many rods of road at one time. The ties would be placed in piles, and the rails as they were loosened would be carried and put across these log heaps. When a sufficient number of rails were placed upon a pile of ties, it would be set on fire. This would heat the rails very much more in the middle than at the ends so that they would naturally bend of their own weight; but the soldiers, to increase the damage, would take tongs and, one or two men at each end of the rail, carry it with force against the nearest tree and twist it around, thus leaving bands to ornament the forest trees of Georgia."

In another passage General Grant records that "like ourselves the rebels had become experts in repairing such damage." Blacksmiths were detailed and set to work making the tools necessary in railroad and bridge building. Timber for bridges and fuel for locomotives was cut; car-builders were set to work repairing locomotives and cars; and, according to General Grant, "every brand of railway building, making tools to work with and supplying the workmen with food, was all going on at once and without the aid of a mechanic or laborer except what the command itself furnished."



WESTERN STAGE COACH, 1862

Many miles of railway in the disputed territory were destroyed and rebuilt a dozen times before the final rehabilitation that followed Lee's surrender.

What a difference the few miles that separated the main lines of the Pennsylvania and the Baltimore & Ohio made was shown in the contrast in the damage and loss suffered by them through the battles and raids that ravaged their common territory. The Pennsylvania suffered little more than

temporary annoyance by being able to withdraw rolling stock and other property from threatened regions. This was noticeably so during the Gettysburg campaign, when General Lee's army penetrated to the neighborhood of Harrisburg. Such effective precautions were undertaken that the general superintendent was able to report that "the whole property of the company escaped untouched and unharmed and it was enabled, as soon as the danger was removed, to resume its operations in full, and with very little delay."

The experience of the Baltimore & Ohio was far different. The Confederate forces in May, 1861, took possession of more than one hundred miles of the main line, mostly between the Point of Rocks and Cumberland; and by occasional raids caused great destruction on the roads between Cumberland and Wheeling and from Grafton to Parkersburg. Locomotives, cars and machinery were carried off and "transported by animal power" over turnpikes to southern railways. In Virginia portions of the Orange & Alexandria and sections of the Virginian and of the Petersburg & Richmond roads were subjected to destruction and reconstruction by the alternating raids and retreats of the Union cavalry.

"C. P. HUNTINGTON" BUILT BY DANFORTH, COOKE & CO.
Shipped Around the Horn, Went Into Central Pacific Service About 1864

The Passing of the Canal

How the scepter of transportation was passing from the waterway to the railway during the decade is sharply illustrated in the following record of tonnage moved in the years 1860 and 1870:

	Tons Moved 1860	Tons Moved 1870
Erie Canal	2,253,533	3,083,132
Erie Railroad	1,139,554	4,852,505
N. Y. Cent'l & Hudson River R.R..	1,028,183	4,122,000

So fifty years ago there could be no mistaking the handwriting on the wall. The artificial waterway had been tried

and been given a long start, but was found wanting in the elements of speed and flexibility to answer the transportation needs of this continent.

In March, 1865, it took Judge Munson, an appointee of President Lincoln, fifty days to complete the trip from St. Louis to Fort Benton, the head of steamboat navigation, 2,000 miles by river on the crack boat of the river. The sinuous windings of the

PERILS OF OVERLAND TRAVEL IN THE '60s
From an Old Drawing

Missouri accounted for doubling the distance as now made by rail in less than 48 hours.

The high cost of steel rails greatly retarded their introduction on American railways, but the invention of the Bessemer process brought them within the resources of our stronger roads, whose officials were quick to see the economy of a rail that cost only twice as much as the best iron rail and lasted eight times as long.

The first steel rails rolled in America were rolled at the Chicago Rolling Mill on May 25, 1865. The total production by 1867 was only 2,277 tons; by 1870 it had risen to 30,357 and the price had dropped from $166.00 per ton to $106.75

and before the end of the next decade it had fallen to $48.25. At first the duty on Bessemer rails was 45 per cent ad valorem, which was gradually reduced until, in 1883, it was $17 per ton and the price of rails went below $40 a ton.

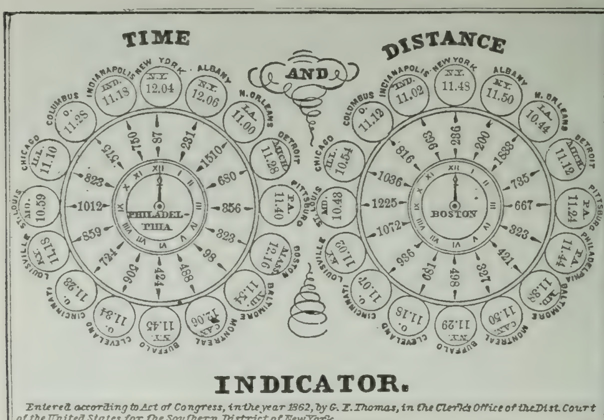
Steam Speed in the Sixties

Appleton's *Railway Guide* for October, 1862, gives an authentic picture of the passenger facilities of the railways during the second year of the War for the Union. These, then as now, were judged by the standard attained on the New York and Chicago run.

FIRST RAILROAD TRAIN IN THE FAR WEST
—From a Rare Print in the Possession of Judge Lyman E. Munson

There was no through service between the two cities in 1862. The Central Railway of New Jersey advertised the shortest line to the West—"Time from New York to Chicago 36 hours—three hours less than Northern Lines." To make good its boast, the Central ran an express train from Jersey City to Pittsburgh "without change" over its own rails to Easton; Lehigh Valley to Allentown; East Pennsylvania Ry.,

to Reading; Lebanon Valley R. R. to Harrisburg, and Pennsylvania Central to Pittsburgh, in 16 hours and 5 minutes. At Pittsburgh the traveler took the Pittsburgh, Fort Wayne & Chicago Ry., composed of that line, the Ohio & Pennsylvania and the Ohio & Indiana, to Chicago—467 miles. This route had an aggregate distance of 898 miles, or 10 miles shorter than what is now the Pennsylvania line between New York and Chicago.



HOW THEY SET THEIR WATCHES IN 1862, BEFORE THE INTRODUCTION OF STANDARD TIME

In Appleton's *Guide* the Pennsylvania road as we know it today was listed under the title of the Pennsylvania Central Ry., with J. Edgar Thomson president. Its entrance to New York was effected over the New Jersey Railway to Jersey City and also by the Camden & Amboy Ry., which had a steam ferry connection at one end and a steamboat ride of 27 miles at the other. If the time tables of 1862 can be relied on, the journey from New York to Chicago via Philadelphia could be made in 33 hours against 20 hours in 1924.

In 1862 the great New York Central System had no Hud-

son River attached to its title and its time tables began with Troy and Albany and ended at Buffalo. At that point its trains connected "with the Lake Shore Railway to Erie, Cleveland, Sandusky, Toledo and thence to Chicago by Michigan Southern Railway." The distance between Chicago and Albany over this combination was 836 miles, to which has to be added the 144 miles from East Albany, reached by ferry via the Hudson River Railway to New York, making a total of 980 miles, which is practically identical with the distance today, if Buffalo is visited en route. The journey with all connections consumed between 38 and 39 hours, which may be compared with the New York Central's Twentieth Century train which makes the run in 20 hours.

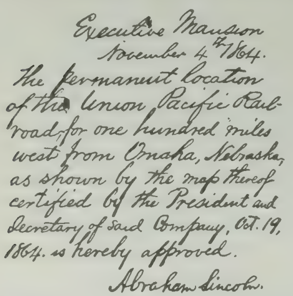
In these time tables of 1862 scrupulous attention is paid to the difference in time between stations, the New York Central note reading: "Standard of Time Clock in Depot at Albany, which is 21 minutes faster than Buffalo time." On the New York & Harlem Railway, which started at the City Hall with stops at White and Center streets, 26th, 42d and Yorkville before it reached Harlem, the standard of time was the "Clock in Superintendent's Office, 26th Street, New York." Frequent reference was made to the "Time Indicator" illustrated above.

An interesting feature of the reading matter accompanying the time table of the Hudson River Railway, which left from the corner of Chambers Street and College Place, was the claim that "Trains of this road run with an expedition, despatch and regularity not surpassed by any other in the country." But even more interesting, as showing the primitive measures taken to secure "the almost entire exception from accidents and collisions" claimed by the management, is the following statement: "One characteristic of this road deserves especial mention. We refer to the system of signal flags introduced to secure safety from accidents in running the trains. Flagmen are stationed upon *every mile of the road* (italics are the *Guide's*), generally at the curves, or upon a slight acclivity, where a view of the track from some dis-

tance can be had. Upon the approach of a train, if all is clear ahead, the flagman displays a *white* signal. If there be any obstruction in sight, or a diminished speed is required, a *red flag* is displayed."

Building of the Union Pacific

Out of the throes of the Civil War, but in the fullness of time, came the great national undertaking known as the Union Pacific Railroad. What Washington, with the eye of a seer and a pioneer surveyor, foresaw as necessary for the survival of the new Nation—uninterrupted communication for the widely separated parts of the republic—Abraham Lincoln put in the way of actual accomplishment when, on November 4, 1864, he certified his approval of the first hundred miles west from Omaha, Nebraska, as the permanent location of the Union Pacific.


Executive Mansion
November 4th 1864.
The permanent location
of the Union Pacific Rail-
road, for one hundred miles
west from Omaha, Nebraska,
as shown by the map thereof
certified by the President and
Secretary of said Company, Oct. 19,
1864. is hereby approved.
Abraham Lincoln.

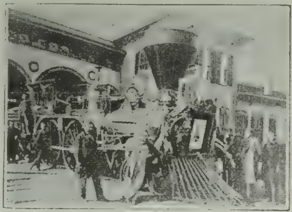
PRESIDENT LINCOLN'S APPROVAL OF THE LOCATION OF THE UNION PACIFIC RAILROAD

That was the "All aboard" for the vast enterprise which for a full generation had been simmering in the minds of Americans who had visions of a great continental railway. How nearly one of the earliest suggestions for this road came to hitting on the exact route finally chosen may be judged by the following extract from an article in the *Emigrant,* a weekly newspaper published in Ann Arbor, in the Territory (!) of Michigan, February 6, 1832, under the title "Something New:"

> "The distance between New York and the Oregon is about three thousand miles,—from New York we could pursue the most convenient route to the vicinity of Lake Erie, thence along the South Shore of this lake and of Lake Michigan, cross the Mississippi between 41 degrees and 42 degrees of north latitude, cross the Missouri about the mouth of the Platte, and thence on by the most convenient route to the Rocky Mountains, near the source of

> the last named river, thence to the Oregon, by the valley of the south branch of that stream called the southern branch of Lewis' river."

The only variance of this route from that finally adopted, which was to reach San Francisco, was that it branched off by the Oregon Short Line route to Oregon and Portland.



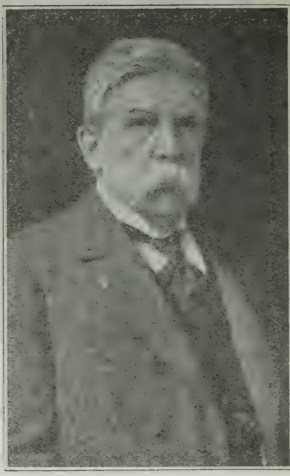
THE LOCOMOTIVE "NASHVILLE" THAT DREW THE LINCOLN FUNERAL TRAIN TO SPRINGFIELD

From this time on projects to span the continent with one or more iron bands multiplied until the memorial fathered by Asa Whitney in favor of building a railway from the Mississippi below the Falls of St. Anthony to the Pacific ocean, under the direction of the secretary of war, was introduced into Congress successively in 1845, 1846 and 1847. Whitney proposed to build his road from the Mississippi to the Pacific coast for a grant of land 30 miles in width along its track. Bills in favor of the Whitney project were

Overland California Stage Coach.

FROM A PRINT OF THE PERIOD
(About 1865)

introduced at both sessions of the 30th Congress, but were defeated through the opposition of Senator Benton, who had his own scheme for a "National Central Highway" with St. Louis as its eastern gateway. Benton's proposal got no farther, but it started the war over the eastern terminus of the Pacific railway, and that was enough to keep all similar projects hanging in the sectional air then thick in Congress, which was to be dispelled only by the flames of civil war.



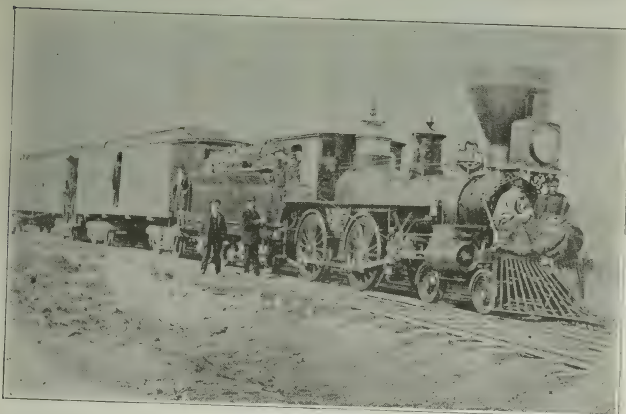
GENERAL GRENVILLE M. DODGE, 1831-1916
Veteran of the Civil War: Chief Engineer of the Union Pacific 1866-70 and of The Texas Pacific 1871-81

Whitney spent his entire fortune in the attempt to realize his vision of a Pacific railway, and ended his life selling milk from his own dairy in Washington, D. C. His project, along with others with different initial points, was allowed to slumber for the next ten years, until the overwhelming sentiment of the country demanded action for the preservation of our national existence. Throughout this period (1849 to 1859) there were five routes before Congress, as follows:

(1) By the 47th and 49th parallels, or the Northern route; (2) by the 41st and 42d parallels, the "Overland," "Central" or "Mormon" route; (3) by the 38th and 39th parallels, or the Buffalo trail; (4) by the 35th parallel; and (5) by the 32d parallel, or Southern route.

Both political parties declared in favor of a Pacific railway, but no majority could be brought to unite on the route. President Buchanan commended the subject to the "friendly consideration" of the 35th Congress (1857-1859) "without

finally committing himself to any particular route." That was the rub that held this mighty essential enterprise in pause through those critical years. Northern capital alone could build the line and Northern capital could only be obtained for



ENGINE "FALCON" ON INSPECTION OF CENTRAL PACIFIC BEFORE DRIVING OF THE GOLD SPIKE AT PROMONTORY

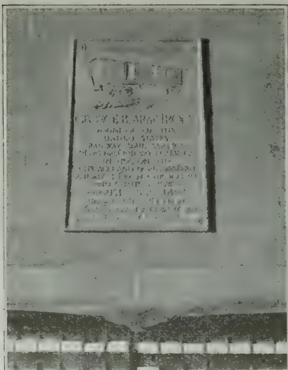
Note—Federal Railroad Commissioners Clements and Blinkendoffer in Wraps on the Cowcatcher

—Photograph Taken Feb. 9, 1869, Courtesy of Mrs. O. C. Waldau, Daughter of W. B. Kendale, the Conductor, Shown with Orders in His Hand

a Northern route. Southern representatives realized this, and so the building of any Pacific railway depending on Federal action and assistance remained an impossibility until after the firing on Sumter, when the North undertook to legislate for the Nation.

With the secession of eleven Southern states, the rivalry of the five sectional routes was reduced to three—the St. Louis interest, the Chicago interest and the Northern interest. In the end the Chicago interest, backed by the wealth and energy of New England and New York, prevailed. By 1860 the Chicago interest had reached the Mississippi at Dubuque, Rock

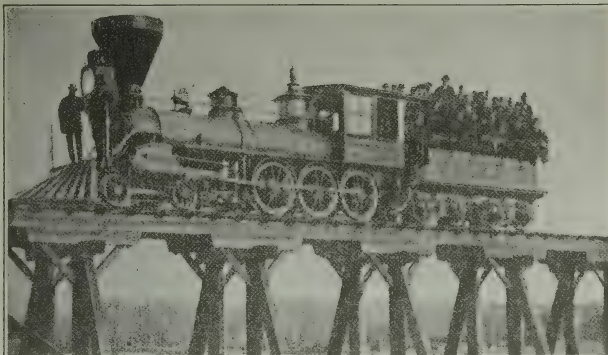
Island and Burlington, from which points respectively the Chicago & North Western, Rock Island and Burlington lines were pushing on across Iowa to Sioux City, Council Bluffs and Platte City, as rapidly as their resources would permit.



TABLET IN THE CHICAGO & NORTH-WESTERN CHICAGO STATION
To Commemorate the Establishment of the First Railway Postal Car Service August 28, 1864

Well nigh a year was consumed in perfecting the Act, which finally received Lincoln's approval on July 1, 1862. It created a corporation to be known as "The Union Pacific Railroad Company," to be composed of 158 persons named in the Act, "together with five Commissioners to be appointed by the Secretary of the Interior. The capital stock was to consist of one hundred thousand shares of one thousand dollars each, of which not more than two hundred shares were to be held by one person." The route named in the Act was to be from a point to be fixed by the President of the United States on the 100th meridian of longitude west from Greenwich * * * thence running westerly upon the most direct, central and practicable route through the territories of the United States to the western boundary of the Territory of Nevada, there to meet and connect with the line of the Central Pacific Railroad Company of California." The grades and curves were not to exceed those of the Baltimore & Ohio Railroad, and the line was required to be completed by July 1, 1874.

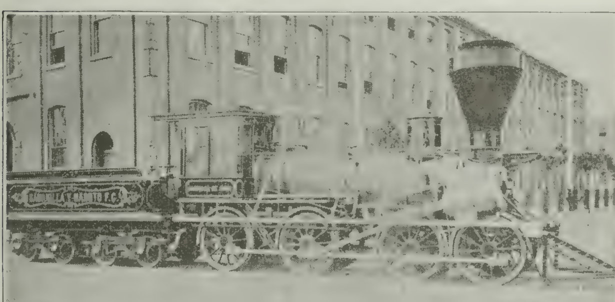
The right of way through public lands 200 feet on each side of the track was granted. Mineral lands were exempted from the grant and the right of way was limited to 100 feet on each side of the track through private property. Further



LOCOMOTIVE "CONNESS" ON TRESTLE OVER AMERICAN RIVER
MARCH 16, 1865
Built by the Mason Locomotive Works, Mass. in 1864 and Shipped Around Cape Horn

aid in the form of United States 30-year 6 per cent bonds not to exceed $50,000,000 were to be issued to the company as the work progressed, such bonds to be paid by it at maturity. This aid was attended with conditions of the most exacting nature.

Like terms and conditions accompanied the grants to the



A BALDWIN FLEXIBLE BEAM TRUCK LOCOMOTIVE
Introduced in 1842
Remodelled in 1865

Central Pacific and it was provided that if either road reached the California boundary before the other it could proceed to a meeting with the other. It was this provision that spurred on the race until the two companies met head-on at Promontory Point, north of Salt Lake, on May 10, 1869.

The Act of 1862 provided that the gauge of the road should be determined by the president, a responsibility Mr. Lincoln did not relish. After much discussion, he named 5 feet, which

PORTLAND, OREGON IN 1867

conformed to the California gauge. Then the New York-Chicago-Iowa combination got busy and secured the passage through Congress of an Act declaring "that the gauge of the Pacific Railroad and its branches throughout the whole extent, from the Pacific coast to the Missouri river, shall be, and hereby is, established at four feet, eight and one-half inches."

That not only fixed the gauge for the Pacific roads but settled officially 4 feet 8½ inches as the standard gauge for the railways of the United States, as it is today.

Omaha Without Railways in 1863

"In 1863," says the historian of that road, "when the act authorizing the Union Pacific was passed by Congress, no single iron rail or railroad tie had ever so much as been seen at Omaha. The end of the nearest railroad building westward from Chicago across Iowa was still 200 miles distant. One frail railroad had recently reached the Missouri River at St.

Joseph, Missouri, 150 miles distant, over which there was uncertain navigation and that during but four months of the year.

"Westward for 2,000 miles stretched that vast Indian infested tract of desert and mountain from the Missouri River to the Pacific Ocean—sun parched in summer and blizzard swept in winter."

In the geographies of those days this inhospitable region was named the "Great American Desert" and the trails across it were marked with headstones instead of milestones.

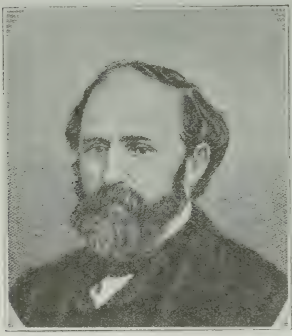
Private capitalists balked at the inducements to invest their funds under the Act of 1862, and it was not until Congress practically doubled these inducements, in 1864, that construction was actually begun, and by September, 1865, the first eleven miles of the Union Pacific were completed. Thereafter the race between the rival Pacifics was on, the Central Pacific having a full year advantage at the start. When they met at Promontory Point, in 1869, the Union Pacific had built 1,086 miles from Omaha and the Central Pacific 689 from Sacramento.

The natural obstacles of mountain and desert made the work exceptionally difficult, dangerous and expensive. The Central Pacific had the advantage of getting its iron, finished supplies and machinery by sea, via Cape Horn or Panama, and also of obtaining coolie labor from China, while the Union Pacific having no railway connection until January, 1867, had to get all its supplies overland from the unfinished railways in Iowa or by Missouri river steamboats. It had also to depend on intractable Irish labor until it was able to recruit more stable forces from the discharged soldiers of the army. Instead of the unified management the Central Pacific enjoyed through a single construction company, the Union Pacific was harassed by the warring factions of the *Credit Mobilier.* In the closing days of this great work the two companies employed at least 25,000 men, about equally divided between them.

Another great advantage enjoyed by the Central Pacific was that the Sierra Nevada furnished all the timber needed

for ties, trestles and snow-sheds, whereas the Union Pacific had scarcely any timber along its line, except the worthless cottonwood of the Platte valley. Both roads were built through a new, uninhabited and uncultivated country and had to set up their own foundries and machine shops as the work progressed.

This unique, difficult and dangerous example of American railway building was admirably described in a paper read before the Society of the Army of the Tennessee by General G. M. Dodge, chief engineer of the Union Pacific during construction.



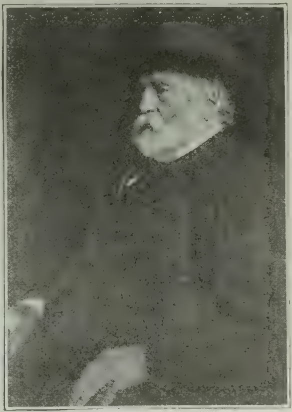
COLLIS P. HUNTINGTON, 1821-1900
Railway Organizer and Builder
"When Too Young to Carry Wood He Picked up Chips"
From a Steel Engraving of the '70s

The work was semi-military in its character. The surveying parties were always accompanied by a detachment of soldiers as a protection against interference by Indians. The construction trains were fully equipped with rifles and other arms, and it was claimed that a gang of tracklayers could be transformed at any moment into a battalion of infantry. As-

ENGINE AND CREW IN CHARGE OF TRANSFER AT PROMONTORY, TAKEN AT THE LAYING OF THE LAST RAIL MAY 10, 1869
—Courtesy W. L. Park

saults on the trains by the Indians were not infrequent.

"There was nothing we could ask of the United States army," wrote General Dodge, "that they did not give, even when the regulations did not authorize it, and it took a long stretch of authority to satisfy all our demands. The commissary department was open to us. Their troops guarded us, and we reconnoitred, surveyed, located and built inside of their picket line. We marched to work to the tap of the drum with our men armed. They stacked their arms on the dump and were ready at a moment's warning to fall in and fight for their territory. General Casement's track train could arm a thousand men at a word; and, from him as a head down to his chief spiker, it could be commanded by experienced officers of every rank from general to a captain. They had served five years at the front, and over half of the men had shouldered a musket in many battles. An illustration of this came to me after our track had passed Plum Creek, 200 miles west of the Missouri River. The Indians had captured a freight train and were in possession of it and its crews. It so happened that I was coming down from the front with my car, which was a traveling arsenal. At Plum Creek station, word came of this capture and stopped us. On my train were perhaps twenty men, some a portion of the crew, some who had been discharged and sought passage to the rear. Nearly all were strangers to me. The excitement of the capture and the reports coming by telegraph of the burning train brought all the men to the platform, and when I called on them to fall in to go forward and retake the train, every man



COLLIS P. HUNTINGTON
From a Photograph Taken Shortly Before His Death in 1900

on the train went into line, and by his position showed that he was a soldier. We ran down slowly until we came in sight of the train. I gave the order to deploy as skirmishers, and at the command they went forward as steadily and in as good order as we had seen the old soldiers climb the face of Kenesaw."

PORTLAND, OREGON, OCT. 5, 1924
Mount Hood Shows in Snow Clad Distance
—*Copyrighted by A. M. Prentiss, Portland*

Here is a description from the *Fortnightly Review* of another phase of the building of the great national railway:

"Track laying on the Union Pacific is a science, and we pundits of the far East stood upon that embankment, only about a thousand miles this side of sunset, and backed westward before the hurrying corps of sturdy operators with a mingled feeling of amusement, curiosity and profound respect. On they came. A light car drawn by a single horse gallops

up to the front with a load of rails. Two men seize the end of a rail and start forward, the rest of the gang taking hold by twos, until it is clear of the car. They come forward at a run. At the word of command the rail is dropped in its place, right side up with care, while the same process goes on at the other side of the car. Less than thirty seconds to a rail for each gang, and so four rails go down to a minute! Quick work, you say, but the fellows on the Union Pacific are tremendously in earnest. The moment the car is empty it is tipped over on the side of the track to let the next loaded car pass it, and then it is tipped back again, and it is a sight to see it go flying back for another load propelled by a horse at full gallop at the end of sixty or eighty feet of rope, ridden by a young Jehu, who drives furiously. Close behind the first gang come the gaugers, spikers and bolters, and a lively time they make of it. It is a grand Anvil Chorus that these sturdy sledges are playing across the plains. It is in triple time, three strokes to a spike. There are ten spikes to a rail four hundred rails to a mile, eighteen hundred miles to San Francisco. * * * Twenty-one million times are those sledges to be swung—twenty-one million times are they to come down with their sharp punctuation, before the great work of modern America is to be completed."

Now, gentle reader, let us take a trip over the Union Pacific during its construction days, boarding the train at Omaha, with the eyes and pen of J. H. Beadle, correspondent of the Cincinnati *Commercial*. He bore a letter of identification from Murat Halstead, the famous war correspondent and editor of that once influential newspaper. The start was made at 6 P. M. July 3, 1868. The road at first ran through a well settled and cultivated country for fifty miles.

"Next morning our eyes rested on an expanse of distance—without life, vast plains, rolling hills, and the mighty Platte six inches deep and two miles wide; 'too thin to walk on, too thick to drink, too shallow for navigation, too deep for safe fording, too yellow to wash in, too pale to paint with—the most disappointing and least useful river in America'." And

yet the imperceptible ascent of the valley of the Platte made the rapid building of the Union Pacific possible.

"Out of North Platte, 291 miles from Omaha, where we breakfasted, we move out over a dry plain following the South Platte. For over a mile the train moves through a settlement of prairie dogs called a 'Dog Town,' occasionally we see a group of Indians looking on from distant sandhills, and are kept alert by the usual rumors of trains held up and plundered by dusky warriors, just ahead of ours, but pass safely on.

"For four hundred miles the eating stations are the only towns we see. Late in the day we reach Cheyenne, only six months ago the 'great city of the plains,' full of boisterous life and sudden death, with a population of six thousand people, which at this date (July, 1868) had shrunk to a quiet and moral town of perhaps fifteen hundred inhabitants.

"From Cheyenne a practically level road takes us rapidly to the eastern base of the Rocky Mountains, from which the rise is steep and rugged up to Sherman, the highest point on the road. Then down the western slope to Laramie, and so on to what was then known as Benton, a short distance beyond the present town of Rawlins." To the correspondent of the *Commercial* in 1868 "it was a typical railway town of mushroom growth with three thousand inhabitants, laid out in a rectangular square, five wards, a city government of mayor and aldermen and all the paraphernalia of a permanent community.

"This, for the time being, was the terminus of construction six hundred and ninety-eight miles from Omaha. From it not a green tree, shrub or spear of grass was to be seen." So far as Mr. Beadle's eyes could reach, "the red hills appeared scorched and bare as if blasted by the lightnings of an angry God. * * * All seemed sacred to the genius of drought and desolation."

Benton was the end of freight and passenger traffic and the beginning of the construction division. Here twice daily immense trains arrived and departed. All goods formerly hauled across the plains came here and were reshipped. "For ten hours daily," says the correspondent, "the streets were

thronged with motley crowds of railroad men, Mexicans and Indians, gamblers, 'cappers' and saloon keepers, merchants, miners and mulewhackers."

The great institution of Benton was the "Big Tent," a structure 100 feet long by 40 feet wide, with a good floor for dancing and many tables for gambling, with every device known to frontier life, from three-card monte down to "rondo-coolo," said to be the least "cutthroat" of these sports. This "Big Tent" was a peripatetic institution that was set up at

WHERE THE UNION PACIFIC AND CENTRAL PACIFIC MET AT PROMONTORY, UTAH, in '69

each successive terminus that marked the advance of the Union Pacific.

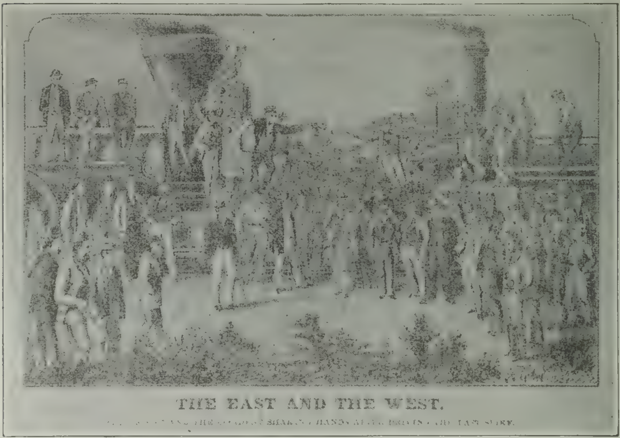
On the 10th of May, 1869, Mr. Beadle witnessed the ceremonies connected with laying the last rail and driving the last spike on the Pacific Railway at Promontory Point, north of Great Salt Lake. There he wrote: "Irish and Chinese laborers met in their great work to place the last bit in the band which weds the Orient and Occident."

It was there the American railways completed the work of binding this Republic in an indissoluble union, to which they contributed so greatly during the decade 1860-1870.

With the three strokes that drove the last spike, the telegraph in every city in the Union clicked off: "ONE, TWO, THREE (pause), DONE

The Credit Mobilier Scandal

Unfortunately the completion of the Union Pacific cannot be dismissed with its junction with the Central Pacific at Promontory Point. While its inception, promotion and completion in the face of political, physical and financial obstacles was a signal triumph of the American spirit that rises to meet emergencies, there were features about its actual



SAME SCENE FROM A PRINT OF THE PERIOD
When Artists Disagree, You Can Take Your Choice. The Camera Was Not as Ubiquitous in 1869 as It is Now

financing and construction that have always detracted from the public's pride in this essentially national achievement. Although time and the fulfillment of all its obligations to the Government, with receiverships and consequent reorganizations, have cleared the title of the Union Pacific from the last shadow of the *Credit Mobilier,* no history of railways in America can ignore it as a passing and past phase of railway construction on this continent.

The story is a long and somewhat intricate one, which may be boiled down to the statement that the construction

of the Union Pacific was let out through the intervention of seven trustees to the *Credit Mobilier,* a company that had taken over the charter rights of the Pennsylvania Fiscal Agency—which included powers of the most elastic nature, with a limitation of liability of its shareholders to the amount of stock subscribed. The African in this seemingly legitimate business transaction was the duplication of the stockholders in the two companies. The seven trustees were to do the work and, as fast as the miles of road built entitled the Union Pacific to receive the pro rata of Government subsidy bonds, first mortgage bonds, land grant bonds and other securities, these were paid over to the trustees, who, after reimbursing themselves for the cost to date, turned the balance over to the *Credit Mobilier* to be distributed among its stockholders.

Testimony before a Senate committee was to the effect that the Union Pacific paid the contractors securities of the face value of $93,546,287; that the work cost the contractors $50,720,959, leaving a balance of $42,825,328 for the *Credit Mobilier.* But as the bonds and stocks were put in at par, where they were disposed of at a heavy discount, the profit on this questionable transaction was reduced to $23,366,319. It was not this profit, enormous as it was, that outraged public sentiment, which was familiar with the "lucky strikes" of railway contractors who took the risks of difficult enterprises, but the exposure of a distribution of *Credit Mobilier* stock "where it would do the most good" in Congress created a political sensation such as has seldom been known in America. The list of those to whom stock had been "sold" included the names of Vice-President Colfax, Vice-President-Elect Wilson, Speaker of the House Blaine, Senator Patterson and Representatives Oakes Ames, Dawes, Schofield, Garfield, Boutwell, Bingham and Kelley.

When Congress began its session in the following December, 1872, Speaker Blaine called Sunset S. Cox to the chair and introduced a resolution calling for an investigation under which what is known as the Poland Committee was appointed. In January following, the Wilson Committee for the same purpose was appointed in the Senate.

After six weeks of almost daily sessions the Poland Committee reported, and its report was referred to the Committee on Judiciary. This committee reported against impeachment because none of the acts complained of had been done by an officer of the House who was such both when the crime was committed and when it was investigated. Its findings on the relation of Representative Oakes Ames to the scandal, which contain the gist of the matter, were as follows:

"Oakes Ames, for the purpose of creating in members of Congress a feeling favorable to the Union Pacific (and *Credit Mobilier*) had sold or agreed to sell to them stock in the *Credit Mobilier* at par when it was worth much more, but instead of having the stock transferred to purchasers on the books of the company, had kept it in his own name as 'trustee,' had received the dividends and accounted for them to the purchasers. His purpose was not to secure positive beneficial legislation, but to prevent possible detrimental legislation, particularly legislative regulation of freight and passenger rates on the Union Pacific as advocated by C. C. Washburn (Wis.) and E. B. Washburne (Ill.). His acts were tantamount to bribery—in the opinion of the committee."

The Poland Committee thereupon recommended the expulsion of Representatives Ames and Brooks (who as a Government director and Congressman had used his position to procure stock in companies directly dependent upon Congressional legislation). The House contented itself with "absolutely condemning the conduct" of Oakes Ames. Within a few months of their condemnation both representatives died—the former's death, on May 8, 1873, being attributed to his immense exertions in building the Union Pacific and the excitement and disgrace of the *Credit Mobilier* scandal.

In the Senate a select committee appointed to consider the evidence taken by the Poland Committee reported in favor of the expulsion of Senator Patterson, but his term expired before the report was acted on.

The Wilson Committee of the Senate reported a bill for the recovery of the excessive profits of the *Credit Mobilier* for

the benefit of the United States. Suit was accordingly brought in the District Court for the District of Connecticut, but on demurrer both the District Court and the Supreme Court on appeal found that the Government had no cause of action. The grounds for this decision, as stated by Justice Hunt of the District Court, are not open to question. In part, he said: "So long as the security of the United States for its loan of bonds and land should not be impaired, and as long as the corporation should perform the public functions imposed upon it by its charter, the United States could not maintain an action for recovery from the Union Pacific of money or other properly, even fraudulently or unlawfully taken from the corporation. * * * In securing the benefits expected from a Pacific railway, the government had given no more than it agreed to give, and the corporation had done and was doing all that the law required."

In affirming the decision, Justice Miller of the Supreme Court said: "It is difficult to see any right which as a creditor the Government had to interfere between the corporation and those with whom it deals. It has been careful to protect its interests in making the contract, and it has the right which that contract gives. What more does it ask?"

In the end the so-called improvident grants made by Congress to the Pacific railways did not turn out so badly. The bread it cast on the arid waters (plains and mountains) returned to it after many years. The grant of land to the Union Pacific netted the company approximately $23,000,000, but added more than that to the value of the alternate sections not granted. The last of the Government bonds issued to the company were finally redeemed with interest.

Summing up the history of the Union Pacific in another connection, the writer said: "Justice in the public mind has never been done—probably never will be—to the courage, enterprise and indomitable energy of the Americans who pushed the great work through financial shoals and physical obstructions to completion. It and the Central Pacific, as well, were built at war prices. Labor was scarce and was to be had only at exorbitant figures. The cost of materials was

well-nigh prohibitive. The price of ties laid down at Omaha ran as high as $2.50. The rails for the first 100 miles of the Union Pacific cost $135 per ton. When railway connection was established between Council Bluffs and the East, this was reduced to $97.50. Government bonds were issued as the work progressed, and netted the company only 65 cents on the dollar. The country through which it was built was the hunting ground of the most warlike Indians of the West.

THE FIRST ENGINE TO REACH ST. PAUL BY BOAT IN 1860 AND GREAT NORTHERN GIANT. OF 1924.

They harassed the work at every stage, from scalping surveying parties to attacks on graders, who worked with their guns stacked within easy reach. It is related that more than half the construction gangs were men who had been through the war, which experience stood them in good stead.

"The conception of this work was an inspiration of patriotism; its financing was a nightmare; its physical construction was a battle between civilization and the forces of savagery and Nature, worthy the pen of Fenimore Cooper; its progress was a Titanic race for subsidies and its completion was hailed with patriotic acclaim throughout the Union. President Lincoln designated the eastern terminus of this transcontinental railway on March 7, 1864, and on May 10, 1869, President Grant received the tidings that the last spike—a golden one from California—had been driven that joined the

rails of the Union and Central Pacific railways at Promontory, Utah." That event was celebrated in a poem by Bret Harte, beginning:

> What was it the engines said,
> Pilots touching head to head,
> Facing on the single track
> Half a world behind each back?

And what was this great work whose completion marked the meeting of the iron girdle across a continent, with half a world behind each pilot? It was a hastily graded, unballasted, indifferently equipped, single track road of 1,921 miles, laid with 56-pound iron rails, through sparsely settled deserts and mountains, which, paradoxical as it may seem, cost three times as much as it was worth and yet was worth many times more than three times as much as it cost.

The Union Pacific of 1923 has more miles of yard track and sidings than the Union Pacific of 1870 had miles of main line.

The decade of 1860-1870, that opened with the terrific struggle to destroy the Union, closed with the completion of the first of the many transcontinental railways that all Americans fervently hope will make that Union forever indissoluble. There were other events in the railway world that made this decade memorable in American history—the crossing of Iowa by no less than five great trunk lines, the Chicago & North Western, the Chicago, Rock Island & Pacific, the Chicago, Milwaukee & St. Paul, the Chicago, Burlington & Quincy and the Illinois Central, which all arrived at the Missouri before the close of 1870. At that time there were 52,922 miles of main line in the United States, an increase of 22,296, no less than 15,242 miles of which were constructed in what twenty years before was truly the Wild West, so far as railways were concerned. In this decade, moreover, nine states—Colorado, Kansas, Minnesota, Nebraska, Nevada, the Dakotas, Oregon and Utah—heard the sound of a locomotive whistle for the first time. In fact a majority of these states were still in the chrysalis or territorial stage when the decade closed. Illinois had established its leadership of the states

for railway mileage, with 4,823 miles of line to Pennsylvania's 4,656, which it was not to relinquish until 1910, when Texas was to overtop them both.

Genesis of Three Western Roads

The story of how three leading western systems were assembled from detached parts into great through lines to connect Chicago with the Pacific roads is worth telling as illustrative of the part consolidations have played in furnishing this continent with the essential links in its transportation system. Take, for instance, the Chicago & North Western, which was the first of the three to reach the goal at Council Bluffs. What may be considered as its main stem started out from Chicago as the Galena & Chicago Union. Originally chartered, in 1836, to build a railway across the prairies toward the Mississippi, the enterprise was caught in the financial panic of 1837 and actual construction was not undertaken until 1847. Eight years later it reached the Father of Waters. In 1859 the Chicago & North Western was formed as the successor to the Chicago, St. Paul & Fond du Lac, itself a consolidation of the two roads chartered in Illinois and Wisconsin as far back as 1851. With the consolidation of these several properties in 1864 and the acquisition by lease of the Cedar Rapids & Missouri, the Chicago & North Western was pushed on to the Missouri in time to assist in the final rush of the Union Pacific on to Ogden. Before the final merger of the integral parts of the system as developed into the modern Chicago & North Western, more than a score of distinct organizations were absorbed and dissolved.

Here again in the evolution of the Chicago & North Western, as was so generally the case in the history of railway construction on this continent, sooner or later, one man played an almost decisive part in the direction of its affairs. In this case William B. Ogden was the man. Born in 1805, he was barely thirty years old when he came west and settled in Chicago, just in time to be elected its first mayor on the city's organization, in 1837. When the project of building the Galena & Chicago Union line, after slumbering eleven years,

was revived, in 1847, Mr. Ogden was chosen for its first president; then he was successively first president of the Chicago, Fond du Lac Railway in 1855, of the Chicago & North Western in 1859 and of the Union Pacific in 1862. He was also a director in the Fort Wayne Railway at its organization, and from 1835 to the time of his death, in 1877, he was easily the most prominent single figure in Chicago and was justly called "the father of transportation systems" of what was then the Northwest.

WILLIAM BUTLER OGDEN
1805-1877
First mayor of Chicago and first president of the Union Pacific

With a purchase of a majority of its stock in 1882 the Chicago & North Western acquired control of the Chicago, St. Paul, Minneapolis & Omaha Railway, itself a successor to several earlier railway enterprises. Like early worms, which are credited with being the original tillers of the earth, these pioneer roads afforded the necessary nourishment for the roads that swallowed them.

The Chicago, Rock Island & Pacific appears to have been one of the few western roads that had a definite objective when it was started. Chartered in 1851 without the Pacific suffix, it reached Rock Island in 1854, beating the Chicago & North Western to the Mississippi by a year. There it yoked up with the Mississippi & Missouri Railway, which was proceeding by easy stages across the State of Iowa. When the two roads were consolidated, the word Pacific was added to the Rock Island's title. The extension to Council Bluffs thereafter was pushed with energy and the junction with the Union Pacific was effected in June, 1869. From this time on the Rock Island extended its lines to the south and west by original construction, at foreclosure sales and by leases as the spirit of expansion dictated, much as farmers annex adjoining meadow, arable and woodlands.

Neither Burlington nor Quincy was mentioned in the genesis of the great Chicago, Burlington & Quincy Company. They were afterthoughts, coming to the fore after the Chi-

cago & Aurora and the Central Military Tract roads were consolidated, in 1858—Quincy being picked up when the Northern Cross road was purchased, and Burlington was included when the line was extended to that city by the purchase of the Peoria & Oquawka road. Oquawka just missed literary fame when Edgar Allen Poe abandoned his design of editing the Oquawka Magazine there. It was not until 1875 and 1880 that the Chicago, Burlington & Quincy acquired the lines and land grants of the Burlington & Missouri in Iowa and Nebraska. From this time on the Chicago, Burlington & Quincy extended its organization over a myriad of embryo roads, thereby forming a strong and harmonious system which has contributed so greatly to the prosperity and progress of the agricultural West.

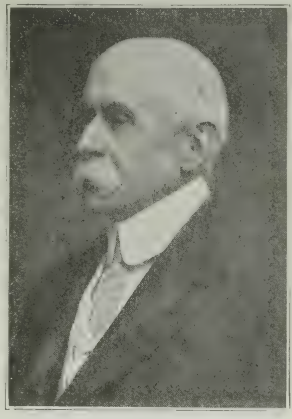
Space only admits of giving the history of these typical instances of railway amalgamation in barest outline, but it will serve to indicate to the student how many of the great railway systems of America have grown up more like Topsy than from any preconceived and carefully worked out design. Necessity called for them and circumstances directed their construction wherever the call seemed most urgent, with such funds as were available. Owing to the lack of design and limited resources, so painfully evidenced in successive receiverships, foreclosures and reorganizations, the immediate results were not always what might have been desired, and yet the ultimate result is the best and most efficient railway system in the world. Surely there is a divinity that has shaped the course of empire on this continent, build the railways as we might.

CHAPTER VI

FIFTH DECADE—1870-1880

Era of Speculation, Regulation, Granger Legislation and Receiverships

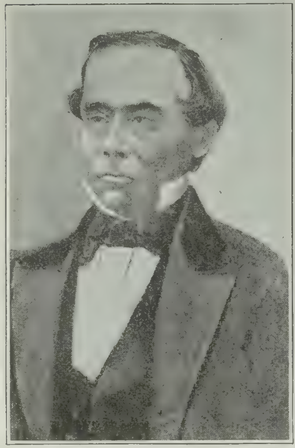
AMERICAN railways went into their fifth decade with an overhang from the preceding decade, notorious in the annals of stock jobbing as "A Chapter of Erie." Starting with its most virulent phase in 1868 in the rivalry for control between Cornelius Vanderbilt and Daniel Drew, this scandal was destined to keep the great national achievement of 1830-1851 in a succession of shameful deals up to the receivership of 1875. From then on the Erie was in financial breakers down to the fourth receivership in 1893 and reorganization in 1894. Since 1896 this road has been managed as a railway should be, to give the best public service in its territory within the limits of its resources. For this due credit has to be given E. B. Thomas, who headed its operations from 1896 to 1900, and to Frederick D. Underwood, who succeeded him in 1901. Their struggle to live down the legacy of debt and dishonor attached to the name Erie by the transgressions of Drew, Gould and Fisk is worthy the best traditions of American railways.



CHARLES FRANCIS ADAMS, JR.
1835-1915
Author, Railway Commissioner, President and Publicist

"The Chapter of Erie," as told by Charles Francis Adams, Jr. in his monograph with that title, is a long and intricate

one which cannot be more than outlined here. It had its prelude in the stock jugglings of Drew as a director and treasurer of the road previous to 1868, by which he was reputed to have accumulated millions. Then came the contest between him and Commodore Vanderbilt, which involved pretty much every variety of maneuver, knavery, abuse of judicial writs, fraudulent issue of securities, corruption of judges and legislators, etc., known to past masters in the tortuous arts of "frenzied finance." Judges were made pawns of the contestants, and a Tammany chief was allowed a receiver's fee of $150,000 when there was no property on Manhattan Island for a receiver to receive. An act which the Drew-Gould interests "lobbied" through at Albany was denounced by Judge Barnard as "a bill for legalizing counterfeit money." Before Gould and Fisk got through with Drew by means of a stock corner, they had stripped him of his last dollar and left him a wreck on the sands of that speculative sea where, for a quarter of a century, he had flown the black flag.



DANIEL DREW—1797-1879
Treasurer Erie Railway 1866-1868

This retribution was Daniel Drew's due, but he and his immediate successors saddled the Erie management with an accumulation of liabilities from which no subsequent reorganization has been sufficiently drastic to completely relieve it. But, more serious still, the Erie scandal has hung like a foul vapor over the railroad world ever since, poisoning the popular mind and filling it with mistrust and suspicion of the most faithful and efficient public utility in

the Nation. Verily, the evil men do lives after them, the good is often interred with their bones.

Jay Gould during his meteoric career was undoubtedly one of the most imposing figures in the financial and railway world. He began his speculation in railway stocks in the early '60s and, besides his ventures in Erie, before his death he had acquired large if not controlling interests in the Wabash, Kansas Pacific, Union Pacific, St. Louis Southwestern, Texas Pacific and Missouri Pacific. He also participated in the organization of the American Telegraph Company, which laid an Atlantic cable and was subsequently merged in the Western Union, of which he was the chief stockholder. At the time of his death Jay Gould's railway holdings were estimated at $75,000,000.

JAY GOULD—1836-1892
Railway Financier, Organizer and President of Many Roads
President and Treasurer of Erie 1868-72

Another Story of Erie

There was, however, another "Story of Erie" written in an altogether different key from that pervading Mr. Adams' classic brochure. Without extenuating any of the shameful incidents attending the exploiting and struggle over its control as told by Mr. Adams, this story traces its history from its inception as set forth in a preceding chapter through its early vicissitudes to its triumphant "opening in Erie" in May, 1851. The official notification of that opening is a cherished historic document in the possession of the Curtis family of Callicoon, N. Y., and sets forth that—

"On the 14th of May inst. the steamboat ERIE will leave the New York and Erie Pier, foot of Duane Street, at 6 A. M.

for Piermont, whence two Trains of Cars will start for Dunkirk and run by the Time Table on the back hereof."

That Time Table allowed for two hours to reach Piermont and an even 13 hours to get to Elmira, 283 miles from the Duane Street pier. Between Port Jervis and Narrowsburg the excursion train was said to have made 34 miles in 35 minutes, a record that has scarcely been bettered since on that particular division. The passengers, among whom were President Fillmore, Governor Marcy of New York, Daniel Webster and as distinguished a body of officials as ever attended an opening, became alarmed and some of them wanted the train stopped so that they could get off. But it proceeded and landed its precious freight safely at Elmira at 7 o'clock, or only 20 minutes late. There they laid up for the night to resume the journey and speech making next morning at 6 o'clock, arriving at Dunkirk "about half past four in the afternoon" of May 15th. The running time from Piermont to Dunkirk, 440 miles, was 21 hours.

From this point on the author, Edward Harold Mott, traces in detail the development of the Erie through a perfect maze of administrations, receiverships, and reorganizations. Jay Gould is pictured on one page as the shrewdest and most unscrupulous speculator that ever matched his wits with the powers of Wall Street, and on the next he is credited with being a railway wizard of the broadest vision and most daring and far flung telegraph and rail enterprise. He certainly

LOS ANGELES IN 1870

LOS ANGELES NOW

Population 1870 with no railways.................... 5,728
Population 1920 with three continental roads........576,673

anticipated the consolidations that have created the great systems of today and, according to Mr. Mott, it was only the evil destiny that seemed to hover over Erie that in the early '70s prevented it from becoming the nucleus of the leading railway organization between the Atlantic and the Pacific.

However, the real "Story of Erie," as it concerns the history of transportation on this continent, is not told in the details of the titanic struggle of the Vanderbilts, the Drews, the Goulds and other speculative financiers for its control in the '60s, but in the development of a railway whose passenger receipts were only $15,165 in 1841, when operation began with only 46 miles of line, and freight receipts were only $14,523, into the system of 2,183 miles today, whose passenger revenues in 1923 were $13,865,994 and freight revenues were $95,853,671. In 1841 the Erie carried 11,627 passengers and 5,779 tons of freight and in 1923 30,985,579 passengers and 48,333,188 tons of freight.

Railroad Building Goes On

Happily for the American people, the clash and clamor of conflicting stock manipulators in New York were but the braying accompaniments to the persistent and substantial progress of railway construction throughout the United States. It was inevitable where the financial necessities of that construction called for the investment of millions upon millions that the birds of prey should hover and scream above the tireless pioneers who were pushing rails of civilization to the limits of the continent. It is one of the triumphs of the conquest of America that it refused to be halted or diverted by the financial corners, booms and panics that attended the projection, construction and completion of its railroads. These financial, industrial and political convulsions may be likened to the growing pains in the human body. They engrossed attention while they lasted and their echoes have never ceased to fill and confuse the public ear. But all the while the work went steadily on, capital to pay for labor, materials and facilities was forthcoming—often at usurious cost—from the slow accumulations of our own people; from British banks and the

deep pockets in the wide breeches of Dutch thrift. The opportunity of gain "beyond the dreams of avarice" was the lure that brought gold from its hidden stores in old stockings and savings banks. The risk was always present to account for high interest or heavy discounts.

But it is not the purpose of this history to dwell upon the romance or the tragedy attending the financing of American railways. It is concerned with the unfolding of the map of the matchless network of rails that binds this Union into a real Nation and that affords to its inhabitants on farm, in the

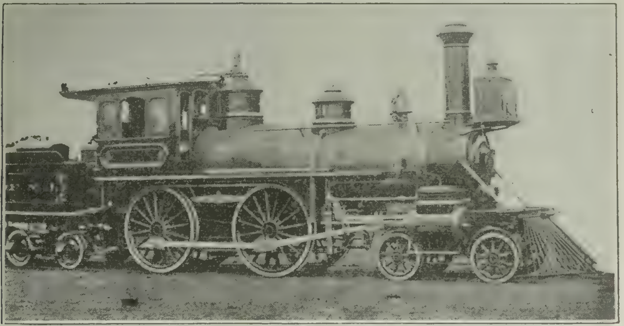
SIXTEEN-HORSE TRAIN CROSSING WYOMING IN 1870

factory, at the bench and in every walk of life the best and cheapest transportation in the world.

From the outset railway construction both in America and England, not to speak of the rest of Europe, was viewed by statesmen, economists and financiers with suspicion and misgivings. In England every charter was obtained only after extended and costly parliamentary proceedings. In the United States early charters were more easily obtained, for the public was impatient for improved transportation. Nation, state and municipality welcomed the rail as a possible relief from the tyranny of poor roads, long hauls and tedious travel. But there were adverse interests even here that had to be placated and overcome. The stage coach, for which the canal development held no terrors, was quick to scent a speedier rival in the locomotive. But the canal had dug deep into the pockets of investors before the railway had established its superior efficiency, and the canal and steamboat interests

quickly took alarm and for several decades put every obstacle they could command in the way of rapid railway expansion.

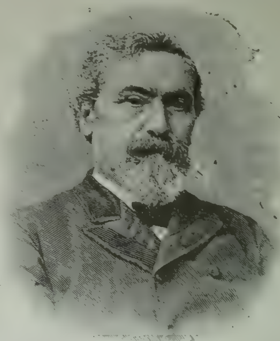
Under such conditions it was natural that Congress and state legislatures should assert some supervision over the railways. At first this assumed the form of requiring annual reports. But this did not long suffice to satisfy the public demand for information about the railways, which under their charters were permitted to do pretty much what they saw fit and to charge rates that were within very liberal maxima.



FIRST CLASS PASSENGER BALDWIN LOCOMOTIVE
Built for Central R. R. of New Jersey in 1875

Railway progress in America had been attended by the popular suspicion of lurking monopoly, the prevailing theory that competition was the life of trade, the mistrust of carrier fixed rates and the jealousy of business concerns and communities over undue preferences and discriminations. Between 1830 and the '70s, competition wherever railways were operated had practically driven stage coaches and artificial waterways out of the carrying trade on this continent only to develop ruinous competition among the rail carriers themselves. Agreements to maintain rates to remedy this condition were made only to be broken like pie crust under the urge to get business. Pooling, or an arbitrary division of

traffic, was resorted to to prevent the recurring rate wars with their disastrous consequences. But it lacked cohesive strength until, in the early '70s, a traffic association of southern roads was effected with Albert Fink, vice-president of the Louisville & Nashville road, as chairman. He proved to possess the ideal requirements of courage, ability and character necessary to inspire confidence in handling the conflicting interests. To these were added exceptional familiarity with the crucial traffic problems involved and the springs of human action. So



ALBERT FINK
Organizer of Joint Traffic Association

it was natural, when the Trunk Line Association was formed, to extend the southern pooling principles to the national field—in 1877, Mr. Fink was chosen as its Moses to lead the railways out of the wilderness of cut rates and shipping discriminations.

Under his guidance the association effected many needed reforms in the handling of railway traffic. But the abuses and discriminations, inherent in the original freedom of railway exploitation from regulation, were too deep rooted in human nature to be cured by any purely voluntary association of its beneficiaries. The rivalry and competition of railway companies and the competition and rivalry of shipping interests which granted preferences, by the former, by cut rates to the latter could be eradicated only by some authority impartial enough to decree "just and reasonable" rates and universal enough to enforce its decrees.

State Regulation

With the completion of the Union Pacific to which the national treasury had contributed so generously, albeit so

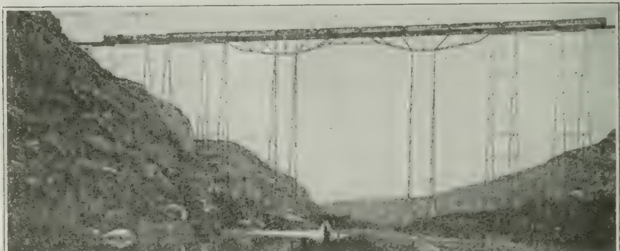
guardedly that every dollar was subsequently repaid with interest by the company, there came a demand for a restriction on the go-as-you-please methods prevailing in railway management during the construction period. Out of the popular dread of monopoly the demand for some state regulation of railways had been growing from their first appearance in competition with canals and stage coaches. They were recognized as necessary public servants but possibly dangerous political masters. Massachusetts had gathered primitive railway statistics as early as 1836, and Rhode Island and New Hampshire had provided themselves with embryo railroad commissions. But it was left for Massachusetts to lead the way to serious supervision of the railways by legislative action in 1869. An Act was passed establishing a commission for the regulation of railways within the commonwealth. By this statute the commission, of which Charles Francis Adams, Jr., was the first chairman, was invested with very broad powers of investigation and recommendation, but was dependent for the enforcement of its findings on public opinion. As the Massachusetts statute became the model for one set of state commissions in contrast with those organized on a widely different principle, the following description by Mr. Adams of its distinctive features has historic as well as pertinent current interest:

"In the West the fundamental idea behind every railroad act was force;—the Commission represented the constable. In the Massachusetts act the fundamental idea was publicity;—the Commission represented public opinion. The law creating the board and defining its field of action was clumsily drawn, and throughout it there was apparent a spirit of distrust in its purpose. In theory an experiment, in reality it was a makeshift. The powers conferred on the commissioners hardly deserved the name; and, such as they were, they were carefully hedged about with limitations against abuse. Accordingly when the commissioners entered upon their duties they were at first inclined to think that they could hardly save themselves from falling into contempt from mere lack of ability to compel respect for their decisions. In fact, however, the law could not have been improved. Had it not been a flagrant legislative guess, it would have been an inspiration. The only appeal provided was in publicity. The board of commissioners was set up as a sort of lens by means of whch the otherwise scattered rays of public opinion could be concentrated to a focus and brought to bear upon a given point. The commissioners had to listen, and they might investigate and report;—they could do little more. Accordingly they were compelled to study their subject,

and with each question that came before them they had to stand or fall on the reasons they presented for their conclusions. They could not take refuge in silence. Whenever they attempted to do so they found themselves in trouble. They had, as each case came up, to argue the side of the corporations or of the public, as the case might be; but always to argue it openly, and in a way which showed that they understood the subject and were at least honest in their convictions. Placed from the beginning in this position, the board was singularly fortunate in the permanence with which its members were continued in office. But two individual changes were made in it during nine years, and it has undergone no change during the last six. Accordingly it had a chance to outlive its inexperience and profit by its own blunders, which naturally were at first neither trifling nor infrequent.

"The result was necessarily as different from that reached in the West, as were the conditions under which it was reached. The board in the first place became of necessity a judicial in place of a prosecuting tribunal. It naturally had often to render decisions upon matters of complaint which came under its cognizance in favor of the railroad corporations;—whether it decided in their favor or against them, however, its decisions carried no weight other than that derived from the reasons given for them. The commissioners were therefore under the necessity of cultivating friendly relations with the railroad officials, and had to inspire them, if they could, with a confidence in their knowledge and fairness. Without that they could not hope to sustain themselves. On the other hand, their failure was imminent unless they so bore themselves as to satisfy the public that they were absolutely independent of corporate influence, and could always be relied upon to fearlessly investigate and impartially decide.

"Undesignedly the Massachusetts legislators had rested their law on the one great social feature which distinguishes modern civilization from any other of which we have a record;—the eventual supremacy of an enlightened public opinion. The line of policy thus happily initiated was carefully pursued. New and wider powers were, year by year, conferred upon the board, but always in the same direction—powers to investigate and report. The commissioners meanwhile were not slow to realize the advantage of their position, and have repeatedly put themselves on record as desiring no more arbitrary powers,—as feeling themselves indeed stronger without them. In 1876 this



TRAIN ON PECOS RIVER BRIDGE, TEXAS
One of the highest bridges in the world, being 321 feet high.

policy reached its final result, as the legislature then placed the entire system of accounts kept by the corporations under the direct supervision of the board. Its power in this respect was unlimited. Not only was it authorized to prescribe a uniform system upon which those accounts should be kept, but they were also to be kept under the immediate and constant supervision of its officers, and on proper application the books were to be publicly investigated. * * * Singularly enough, also, this act was passed not only without opposition from the railroad companies as a body, but with the active assent of many of them. * * *

"This measure carried the Massachusetts method of dealing with the railroad question to its ultimate point of development under a state government. No greater degree of publicity was possible. The system was perfectly simple, but none the less logical and practical. It amounted to little more than the establishment of a permanent board of arbitration, acting without any of the formality, expense and delay of courts of law. On each question which came before it,—whether brought to its notice by means of a postal card or through the action of a city government,—this board was to make an investigation. If wrongs and grievances were made to appear, and no measure of redress could be secured, the appeal was to the courts or the legislature, the board still being the motive force. Thus on all questions, not strictly legal, arising out of the relations of the railroad corporations,—whether among themselves, with the community as a whole or with individuals, a body of experts—supposed to be skilled—was provided, who were clothed with full inquisitorial powers and whose duty it was, whether moved thereto by facts within their own knowledge or brought to their knowledge through the intervention of others, to investigate the doings or condition of the corporations and to lay the resulting facts in detail before the public.

"The policy thus described," concludes Mr. Adams, "would seem to have worked sufficiently well in Massachusetts."

From its earliest introduction state regulation asserted the right to amend the charters of the early railroads in the matter of rates and fares. For specific maximums they substituted the elastic phrase of "just and reasonable rates," which has become the rule of legislatures, courts and commissions.

Along this line regulation had developed the state policy of limiting profits to a fair return on the value of property devoted to public use. This has introduced into their regulation at least two moot questions that admit of the widest difference of opinion. What is a "fair return" and how shall the property be valued? Years of discussion have not brought forth a conclusive answer to either question and both omit the one thing that is of most consequence to the public. They provide no reward or return for efficient and progressive management; proceeding, no doubt, on the theory that good management, like angling and virtue, is its own reward. But

American railways have outstripped all others by rewarding their projectors, builders and managers—not all according to their deserts, but sufficiently to keep ambition alive and active.

No less an authority on this subject than Louis D. Brandeis, now of the United States Supreme Court, has said:

"To take from railroad corporations the natural gifts of efficiency—that is, greater money rewards—must create a sense of injustice suffered, which paralyzes effort, invites inefficiency and produces slipshod management. * * * Large earnings are frequently accepted as evidence that rates are too high, and invite a demand for reduction; whereas, in fact, the large earnings may be due wholly to better judgment, greater efficiency and economies in administration."

BALDWIN'S STEAM MOTOR FOR STREET CAR—1877

The Granger Laws

The success of the Massachusetts brand of regulation, according to Chauncey M. Depew, for years the Nestor of American railway officials, was due to the fact that the commonwealth "had first the independence to appoint a gentleman, Charles Francis Adams, Jr., of character and high principles, who seemed particularly fitted for the work, and then amidst all political changes had the sense and courage to keep him there."

In fact, Massachusetts regulation was sane and effective, and it would have been well if it could have been extended to all other states. But about this time, early in the '70s, a sentiment mistrustful of and hostile to all railways had been aroused throughout the West that knew no moderation. In its view all railways were badly managed, only some were worse than others. This gave rise to the agitation, especially

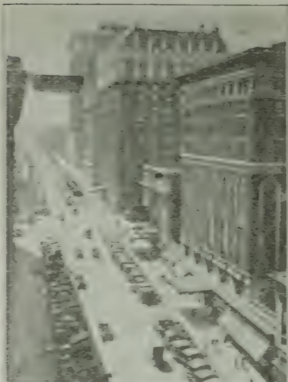
in the West, in favor of drastic regulation of the railways. In 1867 the National Grange of Patrons of Husbandry was formed, consisting of farmers. The local bodies were called granges, and each state had its state grange. Its rules disclaimed any intention to interfere in politics, but it had hardly got under way before it began to take an active, and for a time in the Northwestern states a dominating, part in the agitation against railway rates and other practices, which in 1871 resulted in the passage of two regulatory acts by the Illinois legislature. The first of these fixed maximum rates and fares and the other established a commission to supervise the railroads and to assist in enforcing the laws for their regulation. The former, being declared unconstitutional, was replaced by an act authorizing the commission to prescribe a schedule of "reasonable maximum rates or charges for the transportation of passengers and freight."

The spirit of this legislation spread like a prairie fire through the Western states. Laws of a similar nature were enacted in Iowa, Wisconsin, Missouri, Kansas, Nebraska and Minnesota. Particularly drastic measures were passed in Iowa and Wisconsin. They fixed passenger fares and freight rates in detail. The Iowa law established a fund of $10,000 to pay the expenses of private suitors for damages under the act and made railway officials and employes subject to fine and imprisonment on conviction of violations under the act. The Potter law, as the Wisconsin act was called, not only fixed freight rates but established a revised classification of its own. The railway officials asserted that this law merely took the lowest existing rates for the maximum and then reduced them 25 per cent.


STREET IN OMAHA, NEB.—1874

As was inevitable, these drastic laws quickly got into the Supreme Court of the United States and resulted in a series

of decisions in which new principles regarding the relations of the states to transportation corporations were announced and made the law of the land. They supported the Granger laws to the extent of fixing maximum rates, even though these were challenged on the ground of unreasonableness. These decisions have been modified since.



SAME STREET IN OMAHA—1922
Population
[illegible]
*Increase mostly due to railways

Briefly stated, the court held that the Government had a right to regulate the use of property for the public good and to fix maximum charges for public services of those with whom the public has no choice but to deal. Such regulations were never supposed to deprive private owners of their property, but the devotion of property to a use in which the public has an interest subjects it to that extent to public control.

TRESTLE ACROSS VALLEY NEAR SOUTH OMAHA
Process of Filling for Solid Embankment

This decision was not without question even on the bench from which it issued. Justice Field, one of the ablest jurists that ever sat in that great court, held, in agreement with Justice Strong, that the legislature had no right to interfere with private business and it was giving that body the power to confiscate private property, contrary to the Constitution. It certainly was anomalous, for it violated the charter rights of many of the corporations to charge fixed fares and rates far below the maximums in vogue or established by statutes. The inviolability of many charter contracts was violated ruthlessly. But from that day there has been no doubt that in the United States any industry "affected with a public interest" has been subject to governmental regulation. The only question has been how far the regulation could go before confronting the constitutional inhibition against confiscation. In the period of depressed business to which these state laws contributed, their more drastic provisions were repealed.

GEORGE WESTINGHOUSE

When Air Brakes Came

During the first forty years of railway development on this continent great progress had been made in the application of motive power, in the increase of carrying capacity and in the creature comforts of travel, but the means of stopping trains at stations or holding them back on down grades had not kept pace with the motive power. It had advanced little beyond the foot-brake with which the Jehus of the stage coach period delighted to alarm and reassure their passengers on hilly turnpikes. True, Stephenson by 1833 had equipped one of his locomotives with a steam brake, as shown in the accompanying cut, but

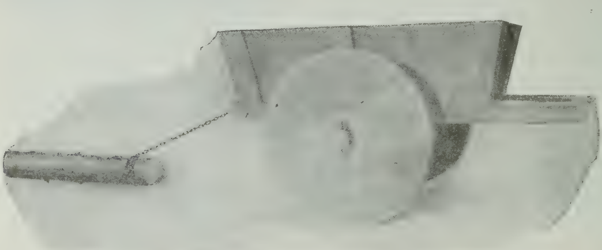
it was applied to a single unit where the demand was for something that would brake every car wheel in the train.

To the young American of today who has not traveled in Europe the hand brakes that still decorate the platforms of passenger cars and project above the roofs of freight cars seem as unnecessary as the vermiform appendix to man. They are relics of the experimental railway age. But they survive on many of the railways of Europe, where thousands of freight cars have no brakes at all and only every third or fourth car in a freight train has its brake and brakeman.

With the increase in the weight and speed of American trains, both passenger and freight, the necessity for some device that would control not only the individual car but the whole train became more insistent. The toll of railway accidents with display headlines in the newspapers alarmed the public and threatened to check the economical development of rail transportation.

As in every other evolution of the transportation industry, the condition found its man. The successor to Watt, Stephenson, Baldwin and the long line of railway projectors and builders was found in the person of George Westinghouse, who was to do for stopping trains what George Stephenson had done for starting them.

Like Watt and Stephenson, Westinghouse was not the first in his field of train brake invention. Watt took the model of Newcomen's engine and put the life of practical improvements into its infant cylinder; and Stephenson found in the

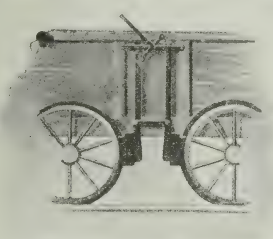


A PRIMITIVE BRAKE—THE DRAG

crude road and track locomotives of Robert Trevethick the elements he combined in the "Planet" and "Rocket," which were the forerunners of the long line of giant locomotives that move the traffic of this continent today. And so George Westinghouse, returning from service in the Union army in 1865, found the field of railway braking strewed with ineffective devices for controlling the wheels of our secondary national industry.

PRIMITIVE DOUBLE ACTION BRAKE

George Westinghouse was born in the village of Central Bridge, N. Y., in October, 1846, but his future was given its bent when his father moved to Schenectady and established himself in that industrial center as a maker of agricultural and mill machinery and small steam engines. As Westinghouse was destined to be the leading personality in one of the greatest industrial organizations in the world, as well as the perfector of the train air brake, a brief sketch of his career will not be amiss here. The American youth can study it with profit. He came, as his biographer says, of Westphalian stock which settled in Bennington county, Vermont, in 1755. It is not necessary to go back of his father and mother to locate his inheritance of the genius that sees things that should be done and the imagination and capacity to do them and the persistence to keep at it until they are done right. His father was possessed of those sterling qualities that seem to inhere in men born in the foothills of Vermont, joined with the ingenious turn of mind that can whittle a model of a mechani-



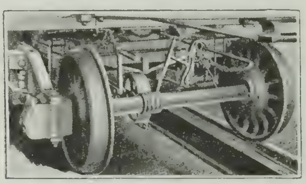
ENGLISH RAILWAY WAGON BRAKE OF 1839

cal contraption out of a cedar shingle or a pine block. He blazed the way for his son to the patent office by preceding him there with some eight to ten inventions for agricultural implements.

On his mother's side, George was kin of Elihu Vedder, one of the foremost decorative and mural artists this country can boast, and it is not unlikely that it was from her he inherited the imagination that saw in the minor inventions of his contemporaries the broader possibilities that under his organizing touch were to revolutionize transportation on this continent.

Westinghouse Enlists at Fifteen

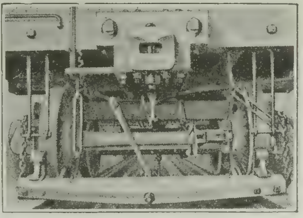
Before he was fifteen George ran away from home to enlist in the early days of the war. He was promptly retrieved by his father and put back to work in the Schenectady shop at 75 cents a day. His pay was gradually raised to $1.12½ a day, until the end of September, 1863, when, being now in his seventeenth year, he was permitted to join the Union army as an enlisted man. He served briefly in the infantry and cavalry and was an officer in the navy when he was mustered out, in 1865, before he was twenty years old. Shortly before his death, in 1914, this veteran of the Civil War said that the chief capital he got out of his army experience was "the lessons in that discipline to which a soldier is required to submit, and the acquirement of a readiness to carry out the instructions of superiors." From the little shop in Schenectady and from a brief sojourn in the camps of the army that preserved the Union, George Westinghouse acquired those habits of thought and action that were to carry him high up on the roll of Americans who have served their country grandly. His school "larnin'" was brief and fragmentary, but his reading was extensive and his command of his mother tongue unusually good and forcible.



THE WIDDEFIELD & BUTTON BRAKE

Within a few months after his return to civil life, in 1865, Westinghouse took out his first patents. The occurrence that directed his attention toward the air brake field in which he was to go so far, according to his biographer, was the mischief that followed a head-on collision that happened on the railway between Schenectady and Troy.

The first form of brake that occurred to his inventive mind was of the buffer kind, in which the brakes on each individual car were automatically applied by impact as the brakes were set on the locomotive. It was quickly abandoned for a coupled chain device running the length of the train, manipulated by power from the locomotive. He found, however, that this was anticipated by the Ambler patent of 1862. From a magazine article describing how the rock drills in the Mont Cenis tunnel were worked with compressed air, Westinghouse got the idea of transmitting that power in tubes from the engine to the brake mechanism under each car.



THE AMERICAN BRAKE

On July 10, 1868, Westinghouse filed his first caveat for a patent relating to the air brake. It was a momentous day, not only for him but for the railway world, when the Steubenville Accommodation on the Panhandle Railroad equipped with this brake began its initial trip from the Union station in Pittsburgh. Its success was immediate. Briefly described, its essential parts were:

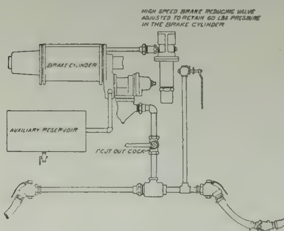
An air pump driven by an engine receiving its steam from the locomotive;

A main reservoir into which air was compressed to sixty or seventy pounds per square inch;

A pipe from the reservoirs to the valve mechanism convenient to the engineer;

Brake cylinders for the tender and each car:

A line of pipe connecting the engineer's brake valve with brake cylinder; flexible connections between cars with couplings and automatic valves opening and closing as cars were joined and separated;

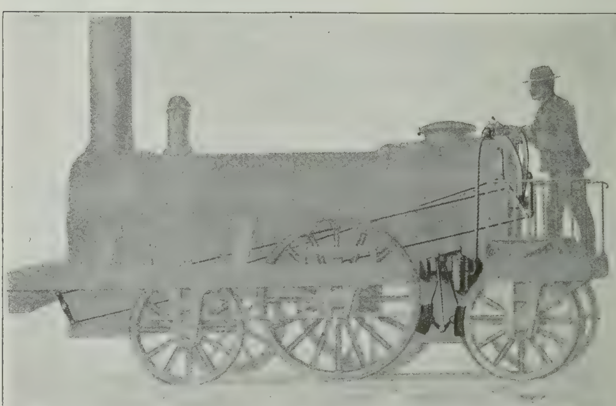


HIGH SPEED PASSENGER BRAKE—1873

The brakes were applied and released by pistons from each cylinder attached to the regular hand brakes;

The brakes were applied when the engineer admitted the compressed air from the locomotive reservoir into the train pipe.

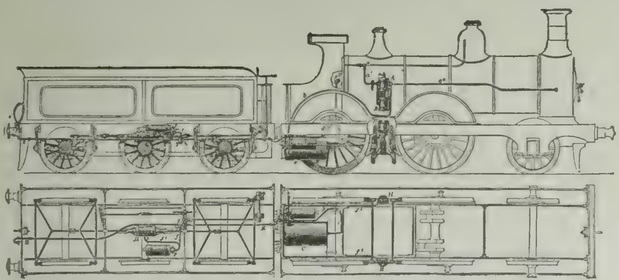
Such was the apparatus known as the "Straight air brake," which was quickly superseded by the "Automatic brake." The difference between the two was fundamental—the straight air apparatus worked by increasing the pressure in the train pipe; the automatic, by the decrease of pressure applied the brakes. With the latter, when a train breaks in two or the



THE STEPHENSON STEAM BRAKE

hose bursts the brakes go on automatically, whereas with the straight air brakes they are put out of commission, and the detached section runs wild.

Almost before the ink was dry on his patents, George Westinghouse organized the Air Brake Company that bears his name to manufacture and market his air brake. It started in 1870 with a small plant in Pittsburgh, consisting of two



View from below.

ENGLISH ENGINE AND TENDER WITH WESTINGHOUSE AUTOMATIC.

buildings with a floor space of 9,600 square feet and a working force of 105.

By 1881 the business had attained such proportions that new quarters were acquired in what was then the city of Allegheny, now the north side of Pittsburgh. It afforded 125,000 square feet of floor space. By 1890, when the business had expanded to a production of 100 complete sets of air brake equipment a day, and numerous other railway devices and appliances connected with the distribution of natural gas, the company was forced to make its second move to the present plant at Wilmerding, Pa., a town 14 miles from Pittsburgh, created to house the army of employees that followed it from Allegheny. Here with buildings having a floor space of 1,083,728 square feet, equal to nearly 25 acres, the largest of its kind in the world, a force of 6,000 men can turn out 1,000 complete standard air brake equipments each twenty-four

hours in addition to a world of miscellaneous apparatus with which the name of Westinghouse is associated.

It would be a congenial task to elaborate on what the automatic air brake has meant to railway development on this continent. Without it we would be struggling along with 20-ton locomotives, 10-ton passenger cars, 20-ton freight cars, 15-car freight trains and a speed limit of 30 to 35 miles an hour on passenger trains. Combined with the automatic signal system, to which Westinghouse contributed many of its best features, the automatic air brake, with its latest im-

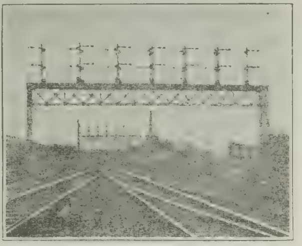
WESTINGHOUSE WORKS AT WILMERDING, PA., 1924

provements, has made railway operation on this continent safe beyond the dreams of its pioneers.

The contrast between the floor space of the original Westinghouse Air Brake plant of 1870 and that of the vast works at Wilmerding in 1923 gives some notion of what this one auxiliary invention meant to the railways and to the people of this Republic. The Westinghouse train air brake gave to American railways that flexibility of expansion that is only partly visualized in the increase in the weight of locomotives on drivers from 15 tons to 100 tons and of the average trainload of 176 tons to nearly 700. It put almost limitless power at the transportation service of the American people. Without it New York would still be almost as far from San Francisco as it was the day after the Union and Central Pacific locomotives met at Promontory Point.

Block Signalling

Hardly had trains between Liverpool and Manchester reached the stage of demonstration when the growth of traffic in weight and speed directed attention to the necessity for some system of signals. So as early as 1834 that road introduced its system of fixed signals, consisting of an upright post with a rotating disk at its top, showing red for danger and the absence of any indication by day and a white light by night for clear. It was soon demonstrated that a narrow arm projected against the horizon or landscape could be seen farther than the same area in a square or circle.



BLOCK SIGNALS

The British system was anticipated in America by the installation on the Newcastle & Frenchtown (now a part of the Pennsylvania R. R.) of signals consisting of a large white ball being raised to the top of the mast when the train left the terminus, and at other stations half way, and, as the trains passed each station, the ball was raised to top of mast and lowered after it had passed the next station. A black ball was used when the train was disabled.

The first semaphore signal was designed at New Cross and erected by Sir Charles Gregory in 1841.

"There was no communcation between stations," said the late A. H. Smith, president of the New York Central Company, in an address before the National Association of Railroad Commissioners in 1909, "each signalman displaying his signal at danger after the passage of a train until a certain time had elapsed, when it was cleared." With certain modifications, this is the basis of our present block and caution signals, but it was not until telegraphic communication was established, as late as 1863, that the first block signals in this

country were installed on the Philadelphia & Trenton Railroad.

In 1866 or 1867 the first automatic electric block system in America was installed on the New Haven System at Meriden, Conn. This system, with some modification, remains in operation today.

Following the manual controlled signals came the automatic of the semaphore type and the adoption of green instead of white for clear signals at night. Then as an additional safeguard against mistakes came the interlocking system, which was installed in yards and at intersections, whereby an operator with one machine or device was able to control the situation over which he presided, so as to prohibit conflicting routes. Gradually the interlocking system was so perfected that greater safety was obtained through central control.

Safety Devices and Accidents

Urged on by sensational reports of accidents, Congress and the Commission, about 1906, became insistent on the adoption of additional safety devices. On June 30, by joint resolution, Congress directed the Commission to investigate and report on the use of and necessity for block signals and appliances for the automatic control of railway trains in the United States. The Commission was able to comply with the first part of this order, but had to report that there had been no practical demonstration of appliances capable of automatically bringing trains to a stop where danger signals for any reason were "ignored by enginemen."

These three quoted words should have put Congress and Commission on inquiry as to the chief cause of the railway accidents that had become so alarmingly frequent. They would have learned that the best safety device known was a careful workman, alert and watchful, in lonely vigil or on the speeding engine. From 1906 to 1924 the campaign for safety devices on American railways has been prosecuted with unintermittent vigor and it has produced gratifying results. But it was not until the railways entered upon their "Safety

First" campaign with their employees that the best results became capable of statistical demonstration.

In a noteworthy address at Milwaukee on October 1, 1912, Commissioner McChord uttered these memorable words:

"The most difficult and perplexing factor in this problem is the personal equation. The failure of the man at the critical moment is the thing to be guarded against, and this involves generally a reformation in methods of discipline and rules of operation." That reformation with and by the hearty co-operation of the personal equation has produced such wonderful results that 1922 saw the railways operated with a total of 40 per cent fewer fatalities than in the year of the commissioner's address—the figures being 6,326 and 10,585, respectively. Moreover, this was in the face of an increase of nearly 30 per cent in freight traffic and over 7 per cent in passenger.

In all railway fatalities, those in train accidents bear the proportion of one to ten of those due to other causes. In some years the proportion has run as one to fifteen. In some years trespassers killed exceed the number of all other fatalities. There has been a marked decrease in this class of fatalities in recent years. Where between 1903 and 1916 the number of trespassers killed exceeded 5,000 annually, in the six following years, 1917-1922, the average was below 3,000.

What progress has been made in protecting train movement with some form of block signals is shown in the following comparison of conditions in 1907 and 1923:

System.	1907. Miles.	1923. Miles.
Automatic Block	11,474	48,084
Controlled Manual	3,491	63,754
Manual Telegraph	44,390	......
Staff or Tablet	247	......
Total	59,602	111,838
Increase in 16 years		52,230

Progress in the installment of automatic train control devices has been slow and cautious because of its experimental nature. The reader may judge of the difficulties attending

its introduction from the following paragraph in the Commission's report of December 12, 1923:

"Observations and tests of eight automatic train control devices that have been installed for test purposes by different carriers were made during the year and plans of 60 devices of this character which were submitted to us for consideration have been examined and reported upon. Of the number examined, 45 were considered impractical or unworthy of further consideration in the form presented; 13 possessed meritorious features but required further development; and 2 possessed merit as safety devices warranting some degree of commendation. One of the latter was of the intermittent magnetic-induction type and the other of the continuous-induction type."

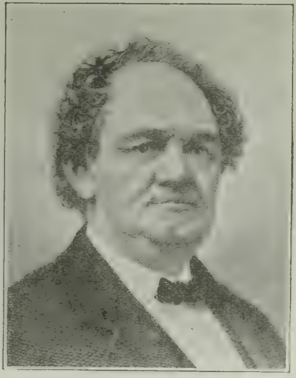
The Commission has now ordered the installment of some form of automatic train control devices on specified divisions of some three score roads. The weak spot in all such automatic devices is that their maintenance, which depends on human vigilance and intelligence, has to be 100 per cent perfect or it endangers all who put their trust in them. All safety devices eventually come back to the personal equation of which Commissioner McChord spoke.

P. T. Barnum's Show First Uses the Railways

Previous to 1872 P. T. Barnum's Greatest Show on Earth made its jumps from town to town in short stages on foot, on horseback or by clumsy caravans, as best it could. In February, 1872, says the greatest autobiographer of his time, Phineas was threatened with a mutiny of his staff manager and his son-in-law, S. H. Hurd, because of his extravagance in adding 100 horses to his retinue of 500 horses, and in buying giraffes and other expensive animals. They figured out what their expenses for 180 days would be and that their receipts could not exceed $350,000, entailing a loss of $370,000 on six months' business. They also declared that their teams could "not travel more than an average of twenty miles per day."

P. T. thanked them for their advice, and continued—at least he says he did—"I see the show is too big to drag from village

to village by horse power and I have laid my plans accordingly. I will immediately telegraph to all the principal railway centers between here and Omaha, Nebraska, and within five days I will tell you what it will cost to transport my whole show, taking leaps of a hundred miles or more in a single night when necessary, so as to hit good-sized towns every day in the season. If I can do this with sixty or seventy freight cars, six passenger cars and three engines, within such a figure as I think it ought to be done, I will do it."



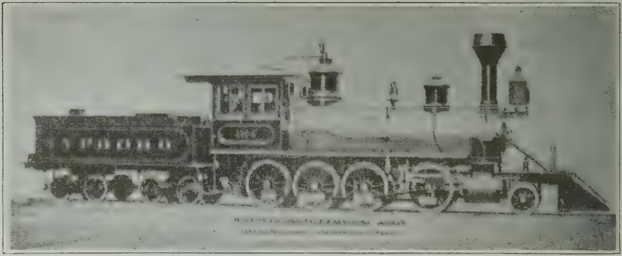
PORTRAIT OF P. T. BARNUM

"Within three days," continues the narrator, "the railroad telegrams were generally favorable and we then and there resolved to transport the entire Museum, Menagerie and Hippodrome, all the coming season by rail, enlisting a power which, if expended on traversing common wagon roads, would be equivalent to *two thousand men and horses*." The italics are Mr. Barnum's, and the world knows he was always within the mark.

In Appendix II to his "Struggles and Triumphs," edition of 1873, Mr. Barnum gives the sequel to this daring venture. "The idea of attempting to transport by rail any company or combination requiring sixty-five cars—to be moved daily from point to point—was an experiment of such magnitude that railroad companies could not supply my demands, and I was compelled to purchase and own all the cars." This he did. "So at the appointed time the great combination moved westward by rail. It visited the States of New Jersey, Delaware, Maryland, Pennsylvania, District of Columbia, Virginia, Ohio, Indiana, Kentucky, Illinois, Missouri, Kansas, Iowa, Minnesota, Wisconsin and Michigan. In order to exhibit only in large towns it was frequently necessary to travel one

hundred miles in a single night, arriving in season to give three exhibitions and the usual street pageant at 8 o'clock A. M."

Thousands and tens of thousands of American citizens living today remember that train, with its P. T. Barnum banners, traversing the continent from New York to the Mississippi, and they will be glad to know that financially it met



BUILT FOR NEW YORK, PENNSYLVANIA & OHIO R. R. IN 1880
—*Courtesy American Locomotive Co.*

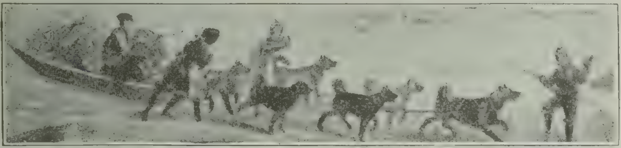
its great projector's anticipations. "The entire six months' receipts of the Great Travelling World's Fair," says he, "exceeded one million dollars. The expenses of the 156 days were nearly $5,000 per day, making about $780,000, besides the interest on a million dollars' capital, and the wear and tear of the whole establishment."

And so the railways once more demonstrated their superiority to any known means of transportation and brought "the greatest show on earth" to the youth of what was then the accessible part of the Union north of the Potomac. Having done this, Mr. Barnum fitted up another "Museum, Menagerie and Circus" for an invasion of the Southern States.

In October Mr. Barnum visited Denver, taking the Kansas Pacific Railroad, "seeing many thousands of wild buffalo, our train sometimes being stopped to let them pass." Since then all the buffalo have passed from those grazing plains into zoos or preserves.

The Panic of 1873

In the progress of society there are always forces at work that make small account of the acts of legislatures and the decrees of courts. So it happened in the case of American railways in the early days of the decade 1870-1880. The Civil War had not only brought all industrial progress to a comparative pause, but by its legacy of an inflated currency had prepared the way for the financial cataclysm of 1873. It is not difficult to trace the part played in this by the railways.



ALASKA DOG SLEDGE OF 1880

Between 1860 and 1865 only 3,303 miles of line were built in the United States. With the return of peace, construction was resumed with feverish activity. In the eight years, 1865 to 1873, the mileage jumped from 35,085 to 70,651 miles—that is, it more than doubled. In the matter of railways the United States was being overbuilt at a rate that presaged a day of reckoning. Where it had been demonstrated, to quote Poor's Manual (1877-78), "that to enable railroads to operate at a profit a population of at least 850 to a mile is necessary in this country," this ratio had fallen from 1,026 in 1860 to 730 in 1870 and to 590 in 1873. In the Western states in 1876 there were only 427 inhabitants to the square mile. More significant still was the shrinkage in gross earnings per mile. These dropped from about $9,000 per mile in 1870 to $8,116 in 1872, to $7,933 in 1873 and before the panic had spent its force to $6,381 in 1877. The large receipts per mile previous to 1871 had furnished the stimulus for the over-construction of unproductive mileage which swept scores of railways into bankruptcy during the business stagnation that attended the restoration of our currency to a sound money basis following

the return to specie payment on January 1, 1879. An examination of the reports of the leading systems that went into the hands of receivers in 1874 reveals the fact that their difficulties proceeded from one of two causes—either they were in process of construction involving the raising of large sums before they had begun to earn sufficient revenues to pay oper-

HELENA, MONTANA—ABOUT 1880
—From Collection of Montana Historical Society

ating expenses; or their income was so depleted by the reduction of rates below a profitable basis that the cost of operation absorbed too large a proportion of their earnings.

The Northern Pacific, which was begun in 1870 and was being built almost directly toward the sunset, was an example of the former. Jay Cooke, whose firm had acted for the Government in floating the Civil War bond issues to the extent of $2,500,000,000, an unheard of sum previous to that time, became the fiscal agent for the Northern Pacific and advanced large sums of money on its bonds. By 1873 it had 555 miles in operation, getting practically nowhere. It had issued

$30,780,940 bonds, from which it had realized only $22,766,923, so that it was paying 7 3-10 per cent on what it received. In 1874 its earnings from operation were only $365,343, or $22,876 more than its expenses, and Jay Cooke, who had so conspicuously assisted in financing the Civil War, was forced to the wall because he could not tide the Northern Pacific through the years succeeding the panic of 1873. The road went into the hands of a receiver and Jay Cooke's firm went into bankruptcy. Through the process of reorganization, in which the bondholders took preferred stock for their principal and interest, the building of the Northern Pacific was resumed and completed, and in the sequel Jay Cooke's fortune was rehabilitated.

How the Granger raid on rates reacted on railway revenues is shown in the decrease of 71-100 of a cent per ton mile between 1871 and 1876. This reduced the operating revenues by approximately $130,000,000, and accounts for the following results, as shown in the receiverships of 1874-77:

In Receiver's Hands

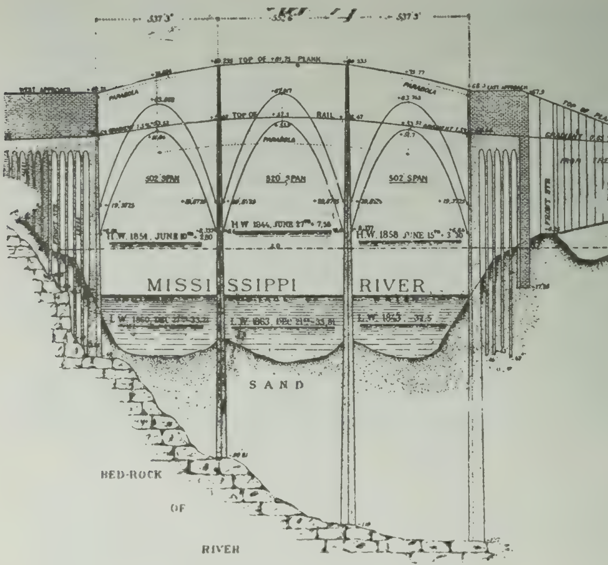
	Mileage.	Capital Stock.	Funded Debt.
1874	6,825	$235,179,273	$236,285,961
1875	6,280	211,740,414	204,312,038
1876	3,692	87,181,928	114,783,799
1877	3,917	65,454,116	95,937,385
Total.....	20,714	$599,555,751	$651,319,183

Among the roads involved in this financial maelstrom were the following well-known titles: The Erie; Long Island; Central Railroad of New Jersey; Mobile & Ohio; Wheeling & Lake Erie; Wisconsin Central; Rio Grande; St. Joseph & Denver City; Northern Pacific; Burlington, Cedar Rapids & Missouri; Burlington & Southwestern; Atlantic & Great Western; New Orleans, St. Louis & Chicago; Chesapeake & Ohio; New Orleans & Texas; Union Pacific and the Kansas Pacific. All told, in the period between 1873 and 1880, inclusive, over 150 roads sought the protection of the courts from insistent creditors. In the reorganization that followed, scores resumed operations under aliases that served

to obscure their identity. Consolidations were then the order of the day. It is well to note that in the receiverships of this period the proportions of capitalization involved were 47.9 per cent stock and 52.1 funded debt.

The Eads Bridge at St. Louis

In the development of railways on this continent the construc-



ENGINEERS PROFILE OF THE EADS BRIDGE

tion of the so-called Eads Bridge across the Mississippi, opened July 4, 1874, ranks high. It is well named after its projector and constructing engineer, who had more than the usual obstructions, financial and skeptical, to overcome before it was accomplished at a cost of about $7,000,000. Some of the physical difficulties to be surmounted can be dimly visualized, by the aid of a magnifying glass, in the little profile illustration given herewith.

But the unruly nature of the Mississippi River, reinforced at this point by the mighty but quixotic Missouri, are left to the imagination. Provision had to be made for seasonal floods that rose thirty or more feet above mean and scoured the bottoms of the piers down to their bases. The main river bridge consisted of three arch spans, one central of 520 feet in the clear and two side arch spans of 502 feet each. The two shore abutments measured

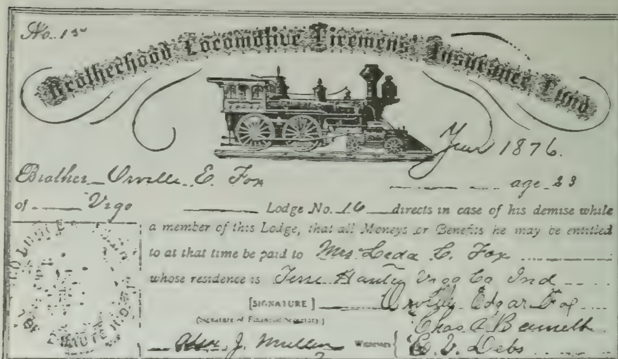
THE EADS BRIDGE AT ST. LOUIS, MO.
Built 50 years ago.

225 feet each. The bridge and approaches were about a mile long and had two levels—for railway and highway.

When completed the Eads Bridge was so scientifically and honestly built that for more than fifty years it has stood steadfast against floods of water and ice, and today presents the firm front of beauty and strength shown in the photograph taken in 1924.

The most spectacular single event in the railway history of this decade was the record breaking run of what was known as the Jarrett and Palmer Special from New York to San Francisco, 3,313.5 miles, in 80 hours and 20 minutes. The distance has since been negotiated in 70 hours. The trip was organized to transport Lawrence Barrett, a leading star actor of the period, and his company, scheduled to appear at

the California Theatre in "Henry V" on June 5, 1876. The special train consisted of locomotive and tender, one Pullman hotel car, one combination passenger and smoking car and one baggage car. It left New York over the Pennsylvania at 12:40 A. M. June 1, and reached Pittsburgh at 10:56 A. M., having made the 439.5 miles in 10 hours and 16 minutes, with one engine and not a single stop; it got to Chicago, 468 miles,


No. 15
Brotherhood Locomotive Firemens' Insurance Fund
4 June 1876.
Brother Orville E. Fox age 23
of Vigo Lodge No. 16 directs in case of his demise while a member of this Lodge, that all Moneys or Benefits he may be entitled to at that time be paid to Mrs. Leda C. Fox
whose residence is Terre Haute Vigo Co Ind
[SIGNATURE] Orville Edgar Fox
(Signature of Financial Secretary) Alex. J. Mullen
Witnesses { Chas. A. Bennett, E. V. Debs

INSURANCE CARD OF BROTHERHOOD OF LOCOMOTIVE FIREMEN IN 1876

that evening at 10:43; to Council Bluffs (503 miles) over the Chicago & North Western at 10:00 A. M.; to Ogden (1,022 miles) over the Union Pacific at 10:57 A. M.; and to San Francisco (881 miles) over the Central Pacific at 12:57 P. M., June 4. The maximum speed attained was 72 miles an hour on the Union Pacific, but the most remarkable run was that from Ogden to San Francisco with a single engine and the air brakes inoperative for more than two-thirds of the way, and sixteen operating stops. They make bigger engines now, but few of them could better that performance, although better is done on regular schedule by at least one road.

Mr. Barrett opened on time, as I know, for I was there

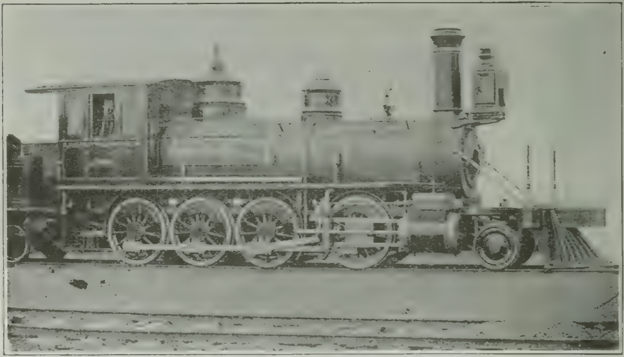
to see him, but he made no such Henry V as George Rignold, who had stolen a march on him.

The Railroad Riots of 1877

Nothing before or since in the nature of railway strikes, accompanied by mob violence and riots, has equaled those that broke out in 1877 and swept across the country, interrupting traffic, resulting in the destruction of millions of dollars' worth of property and costing scores of lives—and accomplishing no good. From the Atlantic to the Pacific, thousands of working men were idle and all were discontented over the reduction in wages attendant on a falling market. In July a 10 per cent reduction in wages on the Baltimore & Ohio precipitated a strike. The engineers and firemen claimed that they could not live and maintain their families on the reduced pay and the company claimed that it could not pay the old scale and earn interest on the capital of the road. The firemen at Martinsburg, Maryland, left their work and drove other men who offered to take their places from the engines. Then the rioting began. The town authorities were powerless. State aid was summoned, but the militia was in sympathy with the strikers. All traffic at Martinsburg was blocked, with nearly 100 locomotives with trains attached blockading the railway yards and stretching two miles on either side of Martinsburg. An angry mob held possession of the city and threatened its destruction. The torch was applied to railway property in various directions. After a clash between the rioters and the Sixth Maryland Regiment, Governor Carroll called on the President for federal aid, which was promptly dispatched from Baltimore, and the riot at Martinsburg ended with a casualty roll of 30 to 40 wounded and 9 killed outright, "all of them rioters," although several of the militia were seriously injured.

The more serious riot at Pittsburgh in the same month followed the same course, only outside rioters took the torch and brickbat and revolver out of the hands of the strikers and threatened Pittsburgh with destruction.

Following the panic of 1873, the Pennsylvania Railroad Company reduced the wages of its employes 10 per cent. As business continued to decline, another reduction of 10 per cent was ordered, effective June 1, 1877. Both these reductions were finally accepted. But on July 16 an order was issued increasing the number of freight cars in a train from 18 to 36,



THE HEAVIEST BALDWIN TYPE OF ITS DATE, 1875
Built for the Lehigh Valley R. R. and Exhibited at the Centennial Exhibition, Philadelphia, 1876.

without increasing the crew, and employing an extra locomotive known as a "pusher" on up grades.

This incensed the train employes, who refused to take out trains, and the crews of all incoming trains joined the strikers. Before the railway officials had time to parley with their employes, a formidable mob gathered from the worst elements of the city. The Mayor appeared on the scene with an inadequate police force and the Sheriff came in with a hastily summoned posse, part of which promptly deserted to the rioters, who greeted the officers with hoots and jeers. The local military were called upon, but proved unequal to the emergency, and as the mob was increasing in numbers and violence the Governor was appealed to and a division of troops was ordered to Pittsburgh from Philadelphia. When it at-

tempted to take up a position to protect the roundhouse, it was met with a shower of stones and other missiles, hitting several soldiers, who were ordered to fire, the first volley killing about 20 persons and wounding 30 others, three of whom were children. The enraged mob closed in on the military and drove them into the roundhouse. This the rioters sought to burn by sending blazing cars of whisky and petroleum down upon it. The commanding officer appealed to the mob to desist or he would open fire. It continued the assault, and another volley added more rioters to the list of casualties.

TYPICAL AMERICAN LOCOMOTIVE OF 1879

This all took place on Saturday. The troops held their position until Sunday morning, when they retreated and went into camp at Sharpsburg. During Saturday night and Sunday the mob took possession of the city and looted the armories and gunshops. On Sunday the roundhouse and all the locomotives in it were destroyed by fire, as were also the Union Depot, the grain elevator, the Adams Express building and the Pan Handle Depot. The firemen were driven away from the burning buildings. A committee of citizens attempted a conference, but found no leaders to confer with. Finally a Committee of Public Safety was organized to take charge of the situation. Governor Hartranft issued a peace proclamation and came personally to Pittsburgh with two or three thousand troops, the Mayor's backbone was stiffened, a number of prominent rioters were arrested, and in a few days quiet was restored.

As an aftermath of this riot, claims to the amount of $4,100,000 for losses due to the failure to maintain order were made on Allegheny county. These were settled for $2,772,349. In all, 25 persons were killed; 1,383 freight cars, 104 locomotives and 66 passenger coaches were destroyed by fire.

The historian of this riot concludes his account of the outbreak with the comment that "The lesson was worth all it

cost, and anarchy has never dared to raise its head in the corporation limits since that time."

The story finds its place in this history because it presents a vivid picture of the course of every attempt to settle industrial disputes by strikes. The cause of the strikers is first espoused by sympathizers, these are quickly joined and outnumbered by the turbulent element in the community, who employ violence and incendiarism in order that they may pillage at their pleasure. Rioters know that rioting loosens the restraining hand of law and order.

Only as the whole community learns that in the end it will have to pay for the damages done in riots, as was the case in Allegheny county, will it rally promptly behind the authorities to preserve *order*, which in very truth is "Heaven's first law."

So far as this strike affected the original issue, the men went back to work at the reduced scale, which stood until April, 1880, when wages were increased 10 per cent, with other adjustments. The increased number of cars in a train stood and the "pusher" became a recognized economic factor in hauling heavy traffic on up grades.

Another contribution to this history brought out by the railway riots of 1877 was the following scale of wages paid by the New York Central & Hudson River Railroad:

	Old Rate.	New Rate.
Engineers, per day........	$ 3.50	$ 3.15
Firemen, per day..........	1.75	1.58
Brakemen, per day.........	1.75	1.58
Switchmen, per mo.........	40.00	36.00
Yard hands, per mo........	$40.00 to $ 55.00	$36.00 to $ 49.50
Shop hands, per mo........	45.00 to 125.00	38.50 to 112.50

The Central strikers demanded a restoration of the 10 per cent reduction, and trains were stopped at Syracuse, Buffalo and West Albany. President Vanderbilt refused to restore wages in the face of threats, but held out promises for the future when business improved.

There were disturbances on the Erie at Gloucester, on the Lake Shore at Cleveland and at Chicago, but the govern-

ors of New York, Ohio and Illinois, by prompt action, prevented their becoming serious.

The Centennial Exposition

Before dismissing this decade it may be well to recall that the progress of railway construction in the United States made the Centennial Celebration at Philadelphia possible as the great gathering of participants from every state in the Union. They were the channels through which the life of the Nation flowed back from its remotest parts to the city of its birth one hundred years before. It was approximately the semi-centennial of railway transportation, without which no such exposition of the material progress in the world as that witnessed at Philadelphia by over 9,000,000 visitors could have been possible.

Among the exhibits at that exposition that were destined to aid in expediting the transaction of business was the typewriter, which in infinitely improved form may be found in 40,000 or 50,000 railway offices today.

At the close of the decade the last gap in the roll of states without railway communication with the rest of the Union had been filled up, and Montana was the only state that was credited with less than 100 miles. The significance of this exception lay in the fact that neither the Northern Pacific nor the Great Northern had made their way across the continent. That great empire-building event was to be reserved for the following decade.

Between 1870 and 1880, in the face of panics, hostile legislation, receiverships and reorganizations, no less than 40,749 miles of railway had been added to the transportation facilities of the American people. Tracks were being laid to connect farms, mines, factories and consumers.

French View of State and Private Railways in 1877

The truth in regard to the relative merits of state and private ownership of railways was as well known half a century ago as today. A writer in the *Journal des Economists*

in August, 1877, states the fundamental differences in these terms:

"When two railways situated in the same country, the one belonging to the Government, the other to a private company, are in almost identical conditions as to working—that is to say, if the receipts per mile of each road and the variations of longitudinal section are approximately the same—we arrive at the following economic deductions:

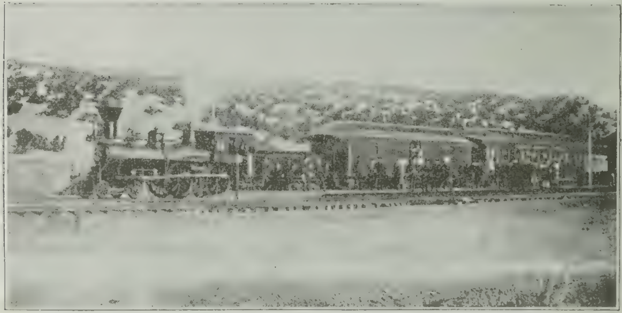
"1. The working co-efficient, or the ratio of expenses to receipts in running the roads, is greater on the government railway than on the private one.

"2. In order to obtain the same receipts, the Government is subjected to a greater expense than the private company.

"3. The rate of interest paid on account of construction capital exceeds on the private railway that realized by the Government railway.

"4. The expenses of working per passenger and per ton of freight under the system of the State are greater than those of the private railway.

"These results, founded upon the figures of the working of many years given us by statistics, are a characteristic mark of the inferiority of the working of railways by the State, compared to the working by private companies."



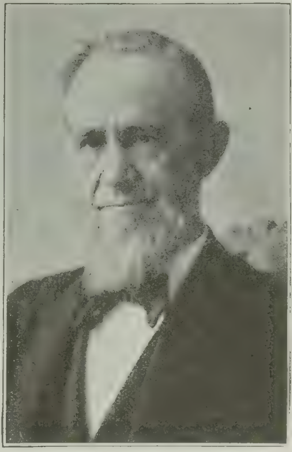
FIRST SANTA FE TRAIN INTO LAMY, N. M., 1877

CHAPTER VII

SIXTH DECADE—1880-1890

When Unrestricted Expansion Reached Its Height and Federal Regulation Began

WORDS cannot add to the story of railway expansion in the United States told by the cold figures of mileage built between 1880 and 1890. When Rutherford B. Hayes entered upon the last year of his presidential term, in March, 1880, there were only 93,671 miles of rail line in the country. As Benjamin Harrison ended his second year in the White House, in 1890, there were 159,271 miles, an increase of 65,600 miles, or 70 per cent as many miles as had been built in the preceding half century. In 1880 the grain elevators in the United States represented an investment of over $10,000,000 and had a capacity of upwards of 27,000,000 bushels of grain.



JUDGE THOMAS M. COOLEY 1824-'98
First Chairman of the Interstate Commerce Commission

This was the reaction of unrestricted American energy and enterprise to adverse conditions which had to be met and overcome throughout the preceding decade. From 1870 to 1880 railway building had proceeded with great rapidity in spite of an extended period of business depression. The demand for increased transportation facilities was so urgent and insistent that new lines were projected, financed and built regardless of scandals, adverse money markets and successive receiverships. The people and their transportation needs demanded the railways,

and one way or another they were provided. But with the return of good times and stable money in 1880 a frenzy of railway construction seized all communities from the Atlantic to the Pacific, and more miles of rail were laid in the United States in a decade than Germany and Austria could boast when they started the World War.

In considering this amazing development, it is well to remember that after the close of our Civil war the republic had

REPRESENTATIVE BALDWIN PASSENGER LOCOMOTIVE 1880
Built for the Atlantic Coast Line

grown at a startling pace. Between 1870 and 1880 the population of the United States had increased from 38,558,371 to 50,155,783 (over 30 per cent) and our national wealth from 16 billion to 30 billion (87 per cent). In the mean time the value of farm lands and property had increased from $8,944,857,749 to $12,180,501,538, or over 36 per cent, chiefly due to accessibility by rail between farm and market.

Where the war had reduced immigration to less than one hundred thousand a year, the return of peace in 1865 revived and swelled it to such an extent that in the following ten years more than three and a quarter million aliens were landed on our shores. The panic of 1873 and the business depression put a damper on the incoming rush of homeseekers who preferred the ills of Europe to the possibilities of the unknown American wilderness. With the return of prosperity the tide of immigration again set in with the force of a released flood, so that in the following decade it reached a

grand total of 5,250,000. While many of these newcomers did not journey far beyond the cities of the seaboard, the vast majority were booked for the vacant lands of the West, whither the railways carried them in ever-increasing numbers. It was during the two decades 1865 to 1875 and 1880 to 1890 that the Northwestern states from the Indiana-Illinois line to the Pacific received those great accessions of foreign-born citizens so necessary to their development, but which have always been suspicious of the one instrumentality that made life in their remote homes not only possible but prosperous beyond the days when they turned their emigrant eyes toward the land of liberty and plenty.

To understand how railway construction and population went hand in hand during the decade 1880-1890 to build up our fertile empire of the West, it is only necessary to glance at the following table of the concurrent increase in railway mileage and population in the principal states of that vast region between those census dates:

	Miles of Railway			Population Increase
	1880.	1890.	Increase.	1880 to 1890.
California	2,220	4,148	1,928	343,436
Colorado	1,531	4,154	2,623	217,871
Idaho	220	941	721	51,775
Illinois	7,955	9,843	1,888	748,480
Iowa	5,235	8,347	3,112	287,281
Kansas	3,439	8,806	5,367	431,000
Michigan	3,931	6,789	2,858	456,952
Minnesota	3,108	5,466	2,358	521,053
Missouri	4,011	5,897	1,886	510,804
Montana	48	2,181	2,133	93,000
Nebraska	2,000	5,274	3,274	606,508
North Dakota	635	1,940	1,305	154,074
Oregon	582	1,269	687	138,999
Oklahoma	275	1,213	938	61,834
South Dakota	630	2,485	1,855	250,332
Texas	3,293	7,911	4,618	643,774
Washington	274	1,699	1,425	274,274
Wisconsin	3,130	5,468	2,338	371,383
Wyoming	472	941	469	39,916
Arizona	384	1,061	677	19,180
New Mexico	643	1,284	641	34,028
Totals	44,016	87,117	43,101	6,255,942
Increase (per cent)			97.9	40.8
United States	93,671	159,271	65,600	12,466,467
Increase (per cent)			70.0	24.8
Balance of States	49,655	72,154	22,499	6,238,469
Increase (per cent)			45.3	17.9

The percentages tell the amazing story of how the over-construction of railways from 1880 to 1890 opened up the valleys of the Mississippi and Missouri to a population that increased over 40 per cent where that of the rest of the Union recorded a gain of less than 18—itself a substantial increase.

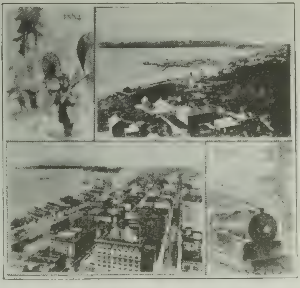
Idaho, Montana, the Dakotas and Washington naturally show phenomenal growth both in railway mileage and population, for it was through these newly admitted states that

SEATTLE, WASH., IN 1878
Population—1870, 1,107; 1920, 315,312

the Northern Pacific and Great Northern were rushing construction to the Pacific.

The southern tier of states was not content to be without a transcontinental railway. But unlike the pioneers of the northern routes they had no frontier jumping off places like Omaha and St. Paul. As far back as 1858 the early settlers of Kansas had perfected measures for the construction of a short line from Atchison to Topeka, a distance of some 50 miles. But the shadow of the coming Civil War cast its blight over this project on which nothing was done for five years, when, under the new title of the Atchison, Topeka & Santa Fe, it was revived with some show of being completed by the aid of a land grant of some 6,400 acres per mile. But

land at $1.25 per acre was a drug on the Kansas market in those days and railway construction required cash. The terms of the grant called for the completion of the entire line to the western border of the state by June, 1873, and when August, 1872, rolled around only 61 miles had been completed. This left the company with over 400 miles to go and only ten months left in which to do it. With bankruptcy staring them in the face in case they failed to make the goal in time, the owners of the road "made the grade" on time, only to be met at the threshold of Colorado by the panic of 1873. By a compromise with their bondholders the road was kept out of receivers' hands during the ensuing depression.



SEATTLE 1884 AND 1924.
Transformation by Rail Transportation. Until the railways came Seattle was a Pacific Port without shipping.
—*L. R. Dale, Photographer.*

In 1880 construction was resumed along the valley of the Rio Grande in the direction of Albuquerque, New Mexico. In this part of its extension the tracklayers followed closely the old Santa Fe trail, which labor-saving policy left a legacy of engineering and expense to their successors in providing the alignment and grades of the present great Santa Fe system. That system had to pass through a maze of negotiations and traffic arrangements with rival companies before it reached the Pacific coast. Then it faced East, and by 1888 it was finally linked up with Chicago, thus completing, after 30 years, a destiny not dreamed of by the incorporators of the Atchison & Topeka Company in 1858.

Another instance of how in the American railway field "great oaks from little acorns grew" is afforded by the history of the Southern Pacific. The acorn of this great system was planted in a little local line of 50 miles from San Francisco to San Jose, chartered as long ago as August, 1860. This road

was taken under the wing of the Central Pacific, in anticipation that it might some day become useful in the golden future that was always dawning in California. That future

FIRST LOAD OF CATTLE ON SEATTLE WATER FRONT, 1880.
Seattle on hill in background

dawned for the San Francisco & San Jose road when, in 1870, Messrs. Stanford, Huntington, Crocker et al detached it from the Central Pacific, which they controlled, and made it the initial section in the Southern Pacific Railroad, then first

SEATTLE, SAME POINT IN 1924
City on hill in distance

organized to build a line to the state line at Yuma, where it was expected to connect with the Texas Pacific. By a branch line to Fort Mohave, on the Colorado river, it was designed to meet the Atlantic & Pacific road then on its way across the Indian Territory. The project had a land grant of 4,800,000 acres from the State of California and was prosecuted with the indomitable will and energy characteristic of the men behind it. Before this, save for a short line in the San Joaquin valley, southern California was without railway

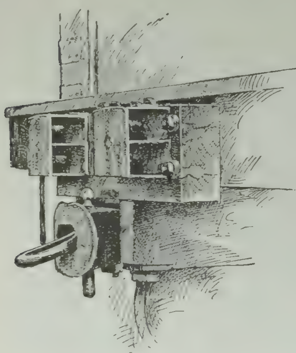
UTAH CENTRAL ENGINE ABOUT 1884
—U. P. Magazine.

connections. In 1870 Los Angeles was a small town of less than 6,000 inhabitants, its connection with the outer world being by steamship from San Pedro on the coast, 25 mlies away. As late as 1880, after railway service had rescued it from its Spanish lethargy, Los Angeles was credited with a census population of only 11,183. Its marvelous growth since then it owes to the railways.

Automatic Couplers

Early in its supervision of railway affairs the attention of the Interstate Commerce Commission was directed to the necessity for some appliances to take the place of the link and pin system that had served to connect railway vehicles from the days of Stephenson and the "Rocket." It was moved to take some action by the frequent fatal accidents incurred in

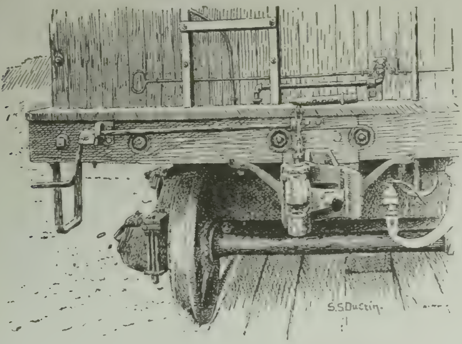
coupling cars and the clumsy and slow process of making the connection. The difficulty confronting the Commission was not to find a substitute for the link-and-pin—the offices of the railways were infested by inventors—but none of them had hit upon the device that would stand the test of "various and extended trial in actual service." As the Commission said in its third annual report for 1889, "Although some thousands of couplers have been patented, the difficulty has not been to choose among good ones, but to find any good one." Uniformity, so that the couplers would couple with one another throughout the country, was an imperative essential in any device to secure the Commission's approval. Many of the couplers "which gave the greatest promise failed on trial," said the Commission.



LINK AND PIN COUPLER

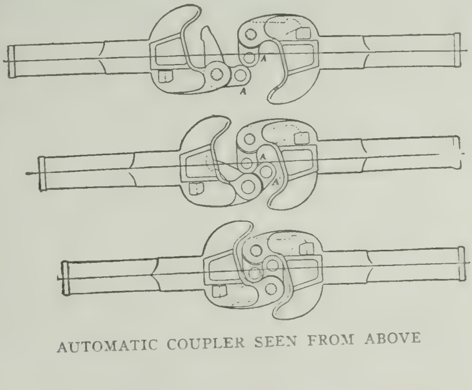
In 1882 the legislature of Connecticut took the initiative and adopted a statute providing that automatic couplers approved by the railroad commission must be placed on all new cars, under penalty. Massachusetts followed this lead in 1884, Michigan in 1885 and New York in 1886. In 1889 New York by statute provided that after November 1, 1892, it should be unlawful for railroads to run any of their own cars in that state unless equipped with automatic couplers. But laws could not be enforced upon roads only partly in one state, and the difficulty and danger of substituting one form for another was very great, the Connecticut commission admitting that the mixture of link couplings with a number of different automatic types tended to increase rather than diminish coupling accidents. The automatic coupler was automatic only with another automatic coupler and not with a link.

In this cut the top figure looking down on the coupler shows one of the latches A, open; the central figure shows the two couplers partly engaged, and the bottom figure shows



JANNEY AUTOMATIC ON A FREIGHT CAR

the coupling completed. Thus the cars are coupled automatically, rendering it unnecessary for the brakeman to go between the cars, as the coupling can be released by means of a rod extending to the side of the car, which is shown in the cut of the perspective of the coupler applied to a freight car.

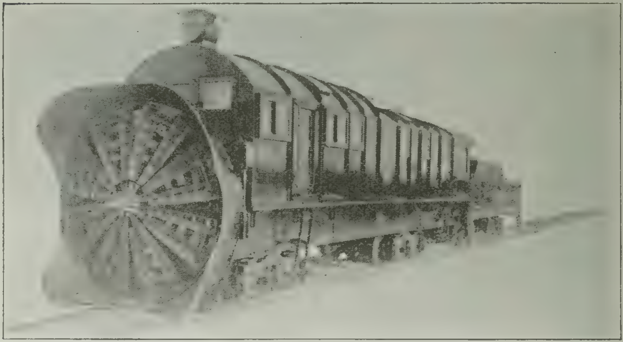


AUTOMATIC COUPLER SEEN FROM ABOVE

The first cut shows the old link and pin coupler. These illustrations are from an article by H. G. Prout on "The American Railways," Scribners, 1889.

By approving the principle of the Janney car coupler but not its specific parts, the Commission side-stepped giving a monopoly of its manufacture to any one person, company or firm.

In 1887 the Master Car Builders' Association, by a vote of 474 to 194, approved a type of "vertical plane coupler" as



ONE FORM OF ROTARY SNOW PLOW

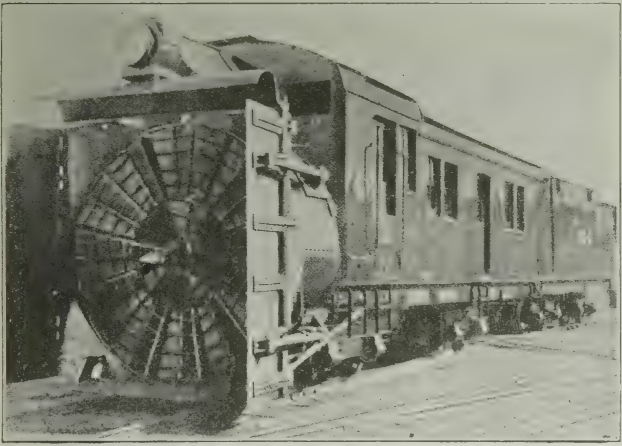
the standard to which all others must conform. The first cost of this standard coupler was from $20 to $25 per car, as against $10 to $15 for the link-and-pin form.

By 1890 the Commission was able to report that 25,551 passenger cars out of 26,820 and 75,485 freight cars out of 918,491 were fitted with automatic couplers. The freight car situation was complicated by the multiplicity of patent couplers, of which there were no less than 38 in actual use, the two leaders being the Janney and the Miller, which divided the majority between them.

By the Act of March 2, 1893, carriers engaged in interstate commerce were required to equip their cars with automatic couplers and their locomotives with driving-wheel

brakes, and by 1900 the Commission was able to report that "for all practical purposes the safety-appliance Act of 1893 has been complied with." In that year it reported that 33,927 passenger cars out of 34,713 and 1,376,051 freight and company cars out of 1,450,838 had been fitted with automatic couplers.

At this writing (1924) the adoption of automatic couplers



ANOTHER PATTERN OF ROTARY SNOW PLOW

and train brakes has become so universal in America as to be no longer a subject for official statistical observation.

How National Regulation Came About

But the decade of 1880-1890 will not be distinguished in railway history by its record of physical construction, although this was unprecedented in the annals of railway building; nor by reason of the financial distress which followed within ten years and was hastened by the too rapid and speculative recovery from the "panic of 1873;" nor for any of the

achievements or failures to meet the demands of an ever-expanding traffic.

The outstanding feature of the decade so far as the railways were concerned was the passage of the "Act to Regulate Commerce," approved February 4, 1887, effective April 5 following. With that date opened a new era in railway construction, operation and management. National regulation did not come upon the railways out of a clear sky. For more than a decade the clouds of popular dissatisfaction with both

HEAVIEST TYPE OF BALDWIN FREIGHT HANDLER USED IN 1886

railway management and state regulation had been gathering. Daily it had become apparent that state legislatures and state commissions were inadequate to deal with the national transportation problem. It had long been recognized in circles of independent thought that the question could not be settled by the authority of the states. This was essentially and naturally prejudiced by local interests. State shippers and merchants camped on the steps of local authority complaining of the discriminating practices of other states and asking for reprisals.

As the railways were extended and consolidated, the bulk of the traffic became more and more interstate in its character and more difficult for the states to handle without undue partiality. This was the fundamental fault of state regulation. Every state wanted to get the best of its neighbors.

The other phase was the too well grounded impression that the railway corporations wandered far away from the restrictions and obligations of public carriers under the common law and had become to a large extent a law unto themselves. Out of the fierce competition of the roads had grown abuses of special privileges and preferences. These arrangements took the form of special rates, rebates, drawbacks, under billing and manipulated classifications. Unjust and unfair practices had become so general and their beneficiaries

HEAVIEST TYPE BALDWIN PASSENGER LOCOMOTIVE USED IN 1889
—Built for Baltimore & Ohio Ry.

so numerous that the demand for their reform gradually crystalized into Congressional action. In regard to some subjects of complaint there was much to be said on both sides of the question. This was specially true in regard to the discriminating rates on the short and long haul business. To many it seemed obviously unjust that a carrier should charge more for a short haul than for a long one. But the experience of the railway world has justified the lower rate on the long haul traffic which was from competitive stations against a higher rate on intermediate non-competitive stations. When the Act came to be written, this distinction was recognized by qualifying the interdiction with the phrase "under essentially similar circumstances and conditions." On that phrase has

hung a world of litigation over the long and short haul clause of the Act to Regulate Commerce.

There were many other features of railway management that conspired to hasten the enactment of the Act to Regulate Commerce. For nearly ten years the subject of some federal legislative regulation had been before Congress. In 1878 Representative Reagan of Texas introduced his first "Interstate Commerce" bill, on which the Act to Regulate Commerce nine years later was based. In his selection of the members of the Commission to exercise the vast powers conferred by this Act, President Cleveland was careful to nominate only men of recognized national repute for ability and judgment. They were:

Thomas M. Cooley, Chairman, of Michigan;
William R. Morrison of Illinois,
Augustus Schoonmaker of New York,
Walter L. Bragg of Alabama,
Aldace F. Walker of Vermont.

The Commission was fortunate and unfortunate in the choice of its two chief subordinates. In its organization for the vast task in hand it could not have found an abler or more energetic man for secretary than Edward A. Moseley, or a more capable and conscientious official statistician than Prof. Henry C. Adams. So long as the Commission was composed of men fully alive to the necessity of constructive regulation, these two men were invaluable in adjusting the work of the Commission to the best transportation needs of the public which were to be attained by stable, reasonable and equitable rates for adequate service. But as the Commission lost the impetus of its original composition, the dominating personality and experience of its secretary became apparent in the antagonistic spirit of regulation toward the railways, while its statistician magnified the role of statistics into management and administration. Mr. Moseley undoubtedly represented the popular spirit of mistrust and suspicion that had demanded the enactment of the law, as Professor Adams represented the prevalent theory of many expert statisticians that a living business can be run by dead accounts.

Fortunately, statistics came to the aid of the railways in an unexpected quarter. The establishment of a uniform system of keeping accounts and rendering reports enabled them to establish the fact that they were not the robbers and extortioners the general public had been led to believe. As the reports of receipts and expenditures and of traffic and public service came under official supervision, it was speedily seen that in the aggregate the transportation of the United States was being handled expeditiously at lower rates than anywhere else in the world. These official reports also showed that the average rate was steadily declining while the price of labor and commodities was advancing. In fact railway rates in the United States have never been exorbitant *per se*.

EDWARD A. MOSELEY
Secretary Interstate Commerce Commission—1889-1909

Chairman Cooley in his first annual report gives the following important testimony as to the remarkable reduction in rates between 1877 and 1887, before the Interstate Commerce Act was passed. "In the former year," said he, "the rates charged on first, second, third and fourth classes of freight from New York to Chicago were respectively 100, 75, 60 and 45 cents a hundred pounds. They are now (1887) 75, 65, 50 and 35 cents, but the classification as to many article has

GEORGE B. McGINTY
Secretary Interstate Commerce Commission 1912

in the meantime been reduced so that the actual reduction is greater than these figures would indicate. Rates from Chicago to New York are proportionately less. A similar result has been apparent elsewhere."

During the decade considered by Chairman Cooley the average receipts per ton mile—that is, per ton of freight carried one mile—so far as ascertained from the incomplete returns of the period, dropped from 1.364 cents in 1877 to 1.063 cents in 1887. In the meantime the passenger receipts had fallen from 2.614 cents in 1877 to 2.276 cents in 1887. By the close of the decade under discussion the average ton mile receipts had fallen to .941 cent and the average receipts per passenger mile to 2.167 cents. The student will find these averages worth remembering, for from them can be traced the gradual decline of the cost to the public of transportation in the United States until, just before the outbreak of the Great War, they reached a point pregnant with disastrous consequences unless the descent was checked.

Capitalization in 1887

In no way has the Act to Regulate Commerce proved more beneficial to American railways than in dissipating much of the popular misapprehension as to their over-capitalization. All through the period of their construction, from the laying of the first rail until their accounts were finally brought under the supervision of the Interstate Commerce Commission, the wildest and widest differences of opinion prevailed as to their capital cost and true value. The scandals attaching to the financing of certain leading systems obscured the vast sums that were expended honestly, faithfully and, on the whole, wisely in the main body of American railways. A continent had to be redeemed from an almost primeval wilderness of forest, mountain, prairie and arid desert. Canals built, as we have seen, at vast expense had failed to solve the problem. As civilization pushed into the wilderness and realized the possibilities that waited on speedy and certain transportation, it took small account of the millions drawn from National, State and Municipal grants and from private sources and

invested irrevocably in making way for the iron highway from ocean to ocean. Throughout the first three decades of this construction period everything about the railroad was in an experimental stage—rails, ties, locomotives, cars, fuel, signals, couplings—nothing had reached a point of permanent adoption. All had to be tried out—the practicable to be adopted, improved and adapted to the different conditions of a vast territory, the impracticable rejected and scrapped. The only thing about American railways that cost less than it was worth was the right of way, and no sooner was the track laid and the line opened than this right of way and adjoining lands increased in value two-fold, ten-fold and in many cases one hundred-fold. But the money to survey, lay out, build and equip that line was scarce and hard to get.

The reader has only to glance at the illustrations in this book to realize the wasteful process of elimination that attended the building of American railways. And if he is a reasonable youth he will have no difficulty in understanding how the early railways of New England cost about $40,000 per mile to build and equip, the middle state roads $53,000, the southern roads $30,000 and the western roads $41,000, as estimated by Henry V. Poor in 1868, the first issue of his invaluable *Manual,* which is a railway library in itself.

Not a decade passed without witnessing a reorganization of scores of companies, involving fresh financing, and it is safe to say that not a single road survived these periodic years of depression without having been sustained and nourished by net income put into improvements and betterments without any corresponding increase in capital account. "The dollar for improvements to one for dividends" has been the slogan that carried American railways to the farthest bounds of the Union with the lowest capitalization per mile of any first class railways in the world.

It is therefore not surprising to find that when the official statistician succeeded in bringing order out of the chaos of railway accounts he found that there was little or no foundation for the charges of over-capitalization that had poisoned

the popular judgment concerning railway accounting. In his first report, in 1888, Professor Adams presented the following summary of railway capital:

	Amount Outstanding	Per Cent of Total Capital	Per Mile of Road
Stock—			
Common	$3,341,476,942	41.11	....
Preferred	522,991,113	6.43	....
Total stocks	$3,864,468,055	47.54	$28,232
Funded Debt—			
Bonds	$3,816,379,040	46.94	....
Car Trust Obligations and Receivers' Certificates	52,837,325	.65	....
Total Funded Debt	$3,869,216,365	47,60	28,266
Current Liabilities	396,103,311	4.87	2,894
Total	$8,129,787,731	100.00	$59,392

(Mileage represented, 136,884.)

The mileage represented in this statement falls 13,018 short of the total railway mileage of the United States in 1888, to which it bore about the same relationship as that of Class 1 roads to the total in 1923.

Much of the confusion and misunderstanding in regard to railway capitalization, property and return on investment that has prevailed under the Act to Regulate Commerce has resulted from the inclusion of revenues from investments with those derived from rates and fares in operation. That Professor Adams understood this may be judged from his statement that "For the railway manager, whose interest centers in operating earnings and operating expenses, that part of the table (the income account) which deals with income from stocks and bonds owned, or from rentals, is of slight importance." And yet for thirty-five years the official statistics were burdened and vitiated with exaggerated capital figures and dividends on duplicated stocks. In 1890 the railway securities owned by the railways amounted to no less than $1,406,907,001, and the net railway capital was $7,577,327,615, or $48,447 per mile. In that year the track mileage in the United States was reported as follows:

Miles of single or main track	156,404
Miles of second track	8,438
Miles of third track	761
Miles of fourth and other track	562
Miles of yard track and sidings	33,711
Total miles of all track	199,876

This would yield a net capitalization of approximately $38,000 per mile of track, including 30,140 locomotives, 26,820 passenger cars, 829,885 freight cars and 31,020 company cars with which to enter the last decade of the 19th century.

From this time on statistics under the uniform system of accounting adopted by the Commission began to play an important—well-nigh a dominating—part in the regulation of American railways. Now statistics are good servants, but poor masters. They are not even a safe crutch. They furnish valuable charts and discover leaks, but they do not provide favoring winds nor propelling steam to ships at sea nor funds to finance railways on land. On the contrary, when developed and specialized to meet the views of impractical social agitators and theorists they lead the unwary into labyrinthian depths where blind leaders are as safe guides as angels of light.

Without wise interpretation, railway statistics are a stumbling block. In the hands of designing demagogues they become a menace to the Republic, whose prosperity depends on progressive transportation facilities.

Railway Labor Organizations

It was in this decade that railway labor organizations began to play an important part in the adjustment of transportation conditions in America. Throughout the constructive period, almost absolute freedom of contract had prevailed, not only with the contractors who built the roads but between the managers who operated them and the men who worked on the trains, in the yards, in the shops, at the keys and in the offices. Individualism was the order of the day and no fixed scale was the standard of pay throughout the Nation.

The underlying principles of labor unionism, as they relate to collective bargaining and movements for the control of working hours and conditions, were introduced into this country from England in the early days of the 19th century. Various trade unions and associations were organized in New England, 1820-1835. New Hampshire made 10 hours a legal day's work in 1847 and the formation of unions became national from Maine to California in 1850-60; and Congress passed an eight-hour law for Government employes in 1868. The spirit of unionism following the war was abroad in the land at that time.

P. M. ARTHUR
First Grand Chief Brotherhood of Locomotive Engineers

It was natural, therefore, that in their different divisions railway employes should yield to the general impuse to organize for mutual protection and benefit. Naturally, too, locomotive engineers, the most distinctive class of railway workers, took the lead. A brief sketch of the inception, organization and development of the Brotherhood of Locomotive Engineers has been furnished the writer by Grand Chief Warren S. Stone. As it pictures the evolution of the leading brotherhood during the years when the relations of management and employes were crystalizing into working agreements, it may be accepted as typical in the best sense, and it is a valuable contribution to this history of American railways.

"Following a very bitter strike on the Michigan Central Railroad in 1862," says Mr. Stone, "W. D. Robinson, at that time secretary of what was known as the National Protective Association, started the new movement which resulted in what is the Brotherhood of Locomotive Engineers today. In April, 1863, he brought together a number of representative locomotive engineers at Marshall, Michigan. This small meet-

ing called a convention of locomotive engineers to meet in Detroit May 5, 1863, and a call was sent out to engineers on the Michigan Central, Michigan Southern, Northern Indiana, Detroit & Milwaukee and Grand Trunk Railways, and the Detroit Branch of the Michigan Southern.

"On the appointed day twelve engineers met in the Fire Department Hall on Jefferson Avenue, Detroit, and for four days devoted themselves to laying the foundation for a permanent organization of railroad engineers and named their organization the 'Brotherhood of the Footboard.' Wm. D. Robinson was made Chief Engineer; George Q. Adams was made Assistant Chief; Ed. Harrison, Secretary, and Sam Keith, Treasurer.

"In 1864 the first convention of the new organization was held in Indianapolis, Indiana. At this convention the name of the organization was changed to Brotherhood of Locomotive Engineers, the name that the organization bears today.

"From its very inception the B. of L. E. grew rapidly and attracted to its ranks the best and most conservative railroad engineers in the country. In 1867 the Locomotive Engineers Mutual Life & Accident Insurance Association was established, and to date this association has paid out in insurance benefits the sum of $53,057,511.95 and has in effect at this writing $183,674,250 of insurance.

"Since that time a Pension Association has been organized which is paying pensions to thousands of former locomotive engineers. A Widows' Pension Association has been organized which is paying pensions to hundreds of widows of former members of the B. of L. E. Pension Association. The B. of L. E. has always taken care of its own and no member of the organization is a public charge.

"The membership of the B. of L. E. is made up of conservative, thinking men who have the well deserved reputation of living up to any agreements made with railroad managements by their executive.

"Since its organization the Brotherhood of Locomotive Engineers has had only four chief executives; the first, W. D. Robinson, served one year. The second grand chief served

ten years. Peter M. Arthur served from 1873 to 1903, and I have been grand chief of the B. of L. E. for a period of twenty-one years.

"Members of the B. of L. E. take a very active interest in politics from a non-partisan standpoint. The entry of the organization into the financial field is so well known that it will be unnecessary for me to go into detail regarding the various activities of the organization along banking and financial lines, but at the present time, through the banks and other financial organizations controlled by the B. of L. E., the organization has control of considerably over $100,000,000.

"It is a rather difficult matter to write a general review of the B. of L. E. and its activities for the reason that we have been much more concerned about the question of daily living than we have in that of making history."

When the Brotherhood of the Footboard was organized, there were less than 6,000 locomotive engineers in America, where there are 70,000 now. Five years after the organization of the engineers, in 1868, the Order of Railway Conductors was formed; in 1873 the Brotherhood of Locomotive Firemen came into existence, and in 1883 the "Big Four" was rounded out with the organization of the Brotherhood of Railway Trainmen. Associated more or less with these four unions have been the Order of Railway Telegraphers and the Switchmen's Union. But to this day the "Big Four" are accepted in the popular mind as the representative railway labor organizations. They have generally maintained an attitude of independence toward the American Federation of Labor, with which the Railway Shop Crafts, so called, are affiliated. The reason for this difference of affiliation is obvious. The members of the "Big Four" are first and last railway men, while the shop crafts are first machinists, carpenters, etc.—in railway employment today and in outside shops tomorrow.

In time nearly all the relations between the four classes of railway employes represented in the four brotherhoods and the railway manager have come to be settled by conferences between officials of the "Big Four" and officials of the

railways. In these conferences the "strike vote" is ostentatiously displayed, but the strike itself is seldom invoked. Reason and the common weal generally prevail and the "Big Four" retires with a half or a quarter loaf, but always something, under its arm to await a more favorable opportunity to come back for the balance of any surplus the railways may accumulate.

The success of these perennial maneuvers is shown in the following record of the average yearly pay of trainmen (exclusive of conductors) by five-year periods since figures are available:

1888	$560	1908	$ 826
1893	598	1913	958
1898	611	1918	1,626
1903	710	1923	1,942

Contemporaneous with this increase for trainmen, the average yearly pay of engineers has increased from $1,020 to $2,800, of conductors from $940 to $2,700 and of firemen from $630 to $2,005. These averages for something over 300,000 men in 1923 may be accepted as a remarkable tribute to the negotiating shrewdness of the officials of the four railway brotherhoods. Thousands of engineers and conductors now earn over $3,000 a year.

In another line the brotherhoods have served their members most effectively. Instead of wasting their resources on strikes and industrial strife, they have developed a most successful system of death and disability insurance. The most distinctive feature of this has been the placing of disability insurance on a parity with death insurance. About 25 per cent of the claims paid out by the railroad brotherhoods are for disability.

With the passage of the Interstate Commerce Act in 1887, the question of the relation of railway management to its employes became one of increasing solicitude to the Commission and its statistics, which have been gradually expanded until they cover every salient feature of railway employment. And the latest railway legislation is aimed to provide means

of deciding labor disputes so as to prevent strikes that would interfere with national transportation.

Although the avoidance of strikes has been the general policy of the typical railway unions, it has not always been successful. The Pittsburgh strike of 1877 has already been discussed. In 1888 occurred the great strike of the engineers of the Chicago, Burlington & Quincy Railway. It was inaugurated against the order of Grand Chief Arthur, but once started received his approval and support. It was bitterly fought and caused severe losses to both carriers and trainmen— to say nothing of the loss and inconvenience of the public. The company finally won, but at a price that left victory with the scars of defeat for many a year.

Then came the Pullman strike of 1894, which started in an industrial struggle between the Pullman Company and its employes and was taken up by the American Railway Union, of which Eugene V. Debs, afterward Socialist candidate for President, was active head. This union, which aimed to embrace all railway labor, declared a sympathetic strike against all roads moving Pullman cars and succeeded in tying up all but six of the 23 railways centering in Chicago. The strike was attended with much violence and bloodshed, there being 12 fatalities and 515 arrests. The loss of the railways was put at $4,600,000, to the Pullman Company at $350,000 and to railway employes at $1,400,000. It was finally broken and order restored, but only after the assertion of Federal supremacy over State authorities by President Cleveland over Governor Altgeld. The American Railway Union never recovered its influence after this defeat. It did not affect the four brotherhoods, which had held aloof from any organized assistance to the sympathetic strike.

The strike of the shop crafts in 1922 will be discussed in its proper place.

CHAPTER VIII

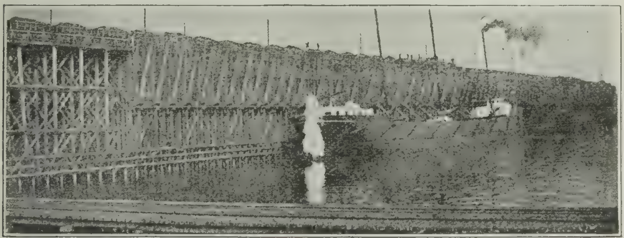
SEVENTH DECADE—1890-1900

Railways Between the Horns of Regulation and Competition—Construction Slows Up

WITH the opening of the last decade of the 19th century the railways of America found themselves confronted with national regulation in its tentative stages while still exposed to all the vicissitudes and temptations of competition. The Commission recognized the vast proportions of the task assigned to it under the Act of 1887 to Regulate Commerce. The railway mileage, in round numbers, was about 160,000. The business included the carriage of 540,000,000 tons of freight and 472,000,000 passengers. Chairman Cooley thus summarized the situation:

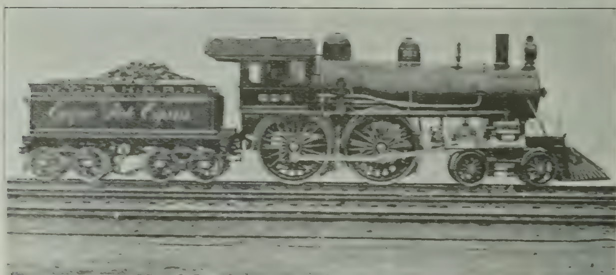
PRAIRIE STRETCH ON THE UNION PACIFIC

"Any criticism upon the efficiency of regulation would obviously be defective if it failed to take note of the vast number of persons and the extent of the business to be regu-



ORE DOCKS AT DULUTH, GREAT NORTHERN RY.
Loading and Unloading by Gravity

lated. The extent of the country is also of vast importance. Railway regulation in a small and compact country, where all the carriers are easily kept under observation, and where the circumstances of carriage are substantially alike, is a small matter compared with the regulation in a country as extensive as this, where the transportation is subject to such variety of circumstances, and where differences in conditions of carriage in the different sections are so striking and so peculiar. That which may be a simple task to a regulating commission

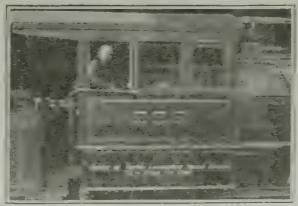


LOCOMOTIVE 999, HOLDER OF THE WORLD'S SPEED RECORD
Attained a speed of 112.5 miles an hour
Built by American Locomotive Company for New York Central R. R.; Exhibited at World's Fair Exposition, Chicago, in 1893.

in any other country is obviously a more complicated and difficult undertaking in the United States, and one that calls for ceaseless exercise of vigilance and exacting labor."

The Commission was quickly confronted with the difficulty of establishing fair and equitable rates where the selfish interests of a majority of all shippers in the land were vitally engaged in getting the better of their competitors in special rates, service and privileges, and the carriers generally had no other alternative to granting preferences, except to lose the business. It was a case of if *you* won't *your competitor* will. So what was a poor carrier to do? The poorer the carrier the harder to resist the pressure. But the necessities of the weaker roads reacted on the stronger, and the cut-throat game went on. The early reports of the Commission, especially

while Judge Cooley was at its head, are full of discussions of the principles underlying the classification of goods for rate-making purposes. In the fourth annual report, for instance, the whole subject is passed under review. Its importance justifies extended quotation, as follows:



The late President A. H. Smith of the New York Central Lines in cab of Locomotive "999."

"The first step toward the imposition of rates for transportation of merchandise is a classification of the articles which, it is supposed, may be offered for carriage, and the arranging of them into classes which are to bear different rates. In making the classification all the considerations that can properly bear upon it are supposed to be taken into account, and they are severally given such weight as the carrier believes it is proper to allow them under all the circumstances attending its own business, and all the business of the section, or of the interests that are served by his road. An important question always is, what is the probable cost of the carriage of the articles severally, and each is supposed to be so classed that the rate it would bear would be such as to cover this cost and also to afford some profit to the carrier. But this is only a general rule. There are many cases in which property may be expected to be offered for transportation, the weight of which, or the

MOGUL OF 18[illegible]
Built for Kymulga & Coosa River R. R. by the Lima Locomotive Works

bulk, is so out of proportion to its value that it cannot possibly, if considered by itself, bear such charges for transportation as will leave any profit to the carriers, and must consequently be carried at a rate that falls below the point of fair profit or not be carried at all.

"This well-known fact has led to the common saying that no traffic must be charged greater rates than it can bear—a saying intended to indicate the maximum, though often understood in quite an opposite sense. It is therefore found that in every classification many articles are so classified that

RAILROAD OVER FLORIDA KEYS AND ISLANDS
Florida East Coast Railway.

the rates upon them will give to the carrier but very slight profit, and if the carrier were deliberately to refuse altogether to transport them the refusal might doubtless in some cases be justified if its own interest were exclusively to be considered. But the considerations that determine the classification in such a case look beyond the particular article, and relieve what would be an oppressive and perhaps prohibitory burden by imposing some portion thereof upon other articles that can better afford to bear it. In every classification, therefore, articles whose value is very great in proportion to the bulk or weight are classed high in expectation that the rates imposed upon them will pay not merely the cost of transportation, and a fair profit to the carrier, but will contribute toward adequate remuneration for the transportation of such articles as cannot bear proportionate charges. Thus the cost of carriage to the carrier itself is no more a controlling consid-

eration than is the value of the carriage to the owner of the property, and when both are taken into account questions of a public character also have weight, inasmuch as it is important to make a great public agency reasonably profitable to its owners, and at the same time as useful as may be to the general public.

"This method of classification has been so long continued and so universal that every well-informed person in a community understands that made, as it is, for the purposes of

BALDWIN FAST PASSENGER LOCOMOTIVE
Built for Baltimore & Ohio R. R. in 1893.

rating it is based upon an almost infinite variety of circumstances having regard not merely to the interests of the carrier and the value of the services but also to the interests of the parties and sections served and to considerations which may change from day to day so as to demand a change in the proportionate rating. * * * The carriers are entirely right in assuming, as they have done heretofore, that they best perform their duty to the public when they take into consideration in making their classification and in fixing their rates, not merely the question of cost to themselves and of value to the owner of the property carried but every consideration of a public nature which can fairly bear upon the question of public usefulness."

Long and Short Hauls

No subject involved in railway regulation demanded and received more patient and illuminating exposition by the Commission than that relating to the conflicting interests of long and short haul business. The statute declared:

"It shall be unlawful for any common carrier subject to the provisions of this Act to charge or receive any greater compensation in the aggregate for the transportation of passengers or of the like kind of property under substantially

PART OF AN OKLAHOMA COTTON TRAIN—1893

similar circumstances and conditions for a shorter than for a longer distance over the same line in the same direction, the shorter being included in the longer distance."

In the fourth annual report (1890) this clause received the following clear elucidation:

"The carriers by rail have so far made their rates and charges fairly proportional as between local and long haul traffic that the clause, if it ever worked injustice to them, does so no longer. Indeed as the general result is to give greater satisfaction to local communities without unjustly affecting the great centers of commerce the outcome cannot fail to be beneficial to the carriers themselves. Nothing is more desirable to any railroad than that its patrons shall be convinced that its rates are just, and they can never be made to believe this while the extraordinary differences in charge which were formerly in many cases as between the long and short haul traffic carried over the same line, are persisted in. Much

of the complaint now made of the clause in question, with a view to affecting public sentiment, ignores altogether the fact that the prohibition of the greater charge for the shorter haul is very much qualified in the statute, and in respect to freights it is limited to those of a like kind carried over the same line in the same direction and under similar circumstances and conditions. A stranger to the law might infer, from some public addresses and pamphlets which have assumed to discuss this subject, that the railroad companies were prohibited

AMERICAN LOCOMOTIVE COMPANY ENGINE OF 1895
Built for the St. Louis, Vandalia & Terre Haute R. R.—Weight loaded, Engine and Tender, 219,000 lbs.

from carrying the necessities of life over long distances at very low rates unless their rates on other subjects of transportation for shorter distances were made to correspond. Indeed, instances have been pointed out in which it was said that certain articles of commerce could not now be transported for long distances because by reason of this provision they would not bear the charges that must under compulsion of law be imposed upon them. Among such instances has been mentioned the granite industry of New England, as to which it has been said that valuable manufactories have ceased to be profitable because it has now become impossible for the properties to obtain from the railroad companies the nominal rates for the transportation of their products which they

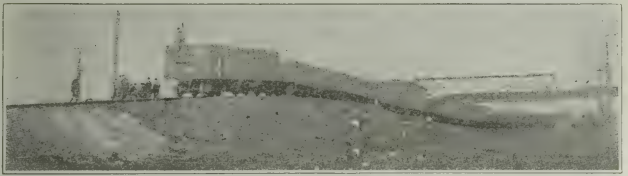
formerly enjoyed, since it is now, by the long and short haul clause, made criminal for the companies to give such rates. A complaint of this nature is not to be met by argument, because it is baseless in point of fact. The instance mentioned may safely be assumed to be chosen rather from regard to the needs of an attack upon the law than from any belief in the justice of its application. The prohibition of the fourth section, so far as concerns this article of commerce, or any other that can be named, will have no application whatever until it is made to appear that elsewhere upon the lines of the roads conveying it there is property of the same kind for transportation by the same carriers in the same direction, upon which the carriers are disposed to making greater charges in the aggregate for the shorter hauls. The wheat of the extreme West, it is also said, can no longer have the nominal rates which were formerly made for transportation to the seaboard, but this assertion is also without point or applicability unless it is shown that the carriers are not only disposed to give such rates but propose to make up the consequent losses to themselves by the imposition of greater charges in the aggregate for the carriage of the like grain when offered for carriage by growers in the States nearer to the seaboard. Nominal rates impartially made as between shippers of like articles in the same direction and under like circumstances and conditions are as admissible now as they ever were.

"A law that does not prohibit an equal charge for the transportation of like articles for the longer distance would seem to be quite as liberal as could be asked for or desired, provided the transportation in each case is under like circumstances and conditions. And such is the law of the clause in question; the same charge may be made for the carriage of the like articles for 10 miles as for a thousand without a violation of its terms."

Nothing could be clearer or more reasonable, and yet complaints under the fourth clause relating to long and short hauls have echoed and re-echoed in the courts and before the Commission from that day to this.

Lions in the Way of Enforcing the Law

The greatest obstacle that confronted the Commission in the enforcement of the law against discriminations, undue preferences, cutting of rates and rebates was the difficulty of getting evidence. This was particularly so where rival carriers were involved. "This is especially the case," says the Commission, "when the prosecution is instituted for the giving of low rates, for, even when this is done unjustly and illegally, it, nevertheless, will have, or seem to have, the effect of favor-



TRAIN ON HUMP FOR SWITCHING

ing localities or important interests, and thereby it secures their approval and invites their support. A carrier who under such circumstances prosecutes, or who aids in prosecution, does so at the risk, not merely of submitting itself to such annoyances and expense as commonly attend a criminal proceeding, but also of appearing in the eyes of an influential portion of those for whose favor all are competing, as the prosecutors of a rival whose real offense, whatever it may be nominally, consists in the fact that in the struggle for business it has been the more successful of the two, and for the commendable reason, if lawfully done, that it has conceded more to the demands of competition and been less severe in its exactions. The risk of arousing against themselves a prejudice of this nature is one which the Commission shows the carriers are very slow to encounter."

In illustration of what the carriers were "up against" in this regard, the Commission published the following portion

of a letter it received from the general manager of one of the roads terminating in Chicago:

"Referring to your complaint against railroad officials that they admit, state and charge that the published rates are cut in violation of the law, while at the same time fail and refuse to give any evidence to the Commission, I beg to say that it is true that we do make such charges and have information about cut rates that warrants us in making them; still we dare not use it with the Commission or in Court. The transportation of this country is handled by a comparatively small number of persons who are all interested in getting the lowest rates possible and the greatest advantage over their competitors. These shippers we must depend upon for business, and if any railroad company or any railroad officials should go into Court or before the Commission with charges that such shippers are receiving favors from other railroad companies, it would result in that railroad company or the company represented by such officials being boycotted by the majority of the shippers. In other words, they do not want the law enforced so long as they get an advantage in its violation. The * * * Railroad Company and its officers desire that the interstate commerce law is enforced, but for reasons above given we dare not use the information we receive in various ways as to what is being done by our competitors and connections. Of course this information is not in the nature of absolute proof, but it is in the nature of prices paid for commodities and the direction that traffic takes, which is not its natural channel. In some cases shippers state frankly that they are getting concessions, but of course do not divulge just how much, or how it is done, and even were we disposed to use the information we get I do not know that it would be competent evidence."

Here was a state of things involving carriers and shippers in every section of the country where competition was "the life of trade" as well as the theory of the Act to Regulate Commerce. Carriers and shippers who fain would obey the statute were driven willy-nilly into their only alternative of retaliation in kind. Naturally the railways bore the brunt of public reprobation, while the shippers, who pocketed the profit of the illegal transaction, subscribed liberally to campaign funds and foreign missions and largely escaped criticism.

The Effect on Railway Construction

One of the untoward effects of the national assumption of its right to regulate the railroads was the brake it put on railroad construction. Where this had been proceeding at the rate of 6,500 miles of new line per year over a ten-year period, it dropped to an average of about 3,600 in the next decade. Where railway building had been anticipating population, it was restricted to the current needs of the people of

the United States. The returns show that there was little variation in the averages in inhabitants per mile of line between 1890 and 1910, and since that year population has been outstripping railway construction.

Commenting on this condition in his report of 1893, Professor Adams, the official statistician, said:

"When it is noticed that the increase of railway mileage was 4,897, it at once becomes apparent that the tendency

BALDWIN 1896 FOR THE ATLANTIC CITY R. R.
Used in high speed passenger service. One of fastest locomotives ever built.

toward merger, consolidation, lease, traffic agreement and the like is relatively stronger than the tendency towards railway construction."

The World's Fair and Panic of 1893

Under the impetus of the Columbian Exposition held at Chicago in 1893, railway traffic reached its highest record up to that time. The story of this accomplishment is briefly told in the returns for the four years that included that wonderful quadricentennal of the discovery of America:

	Passengers Carried 1 Mile.	Freight Tons Carried 1 Mile.
1892	13,362,898,299	88,241,050,225
1893	14,229,101,084	93,588,111,833
1894	14,289,445,893	80,335,104,702
1895	12,188,446,271	85,227,515,891

For the full meaning of these figures it is necessary to remember that they relate to the fiscal year ending June 30 in each case. This threw the heavy attendance at the World's Fair from July 1 into the 1894 returns, accounting for the large passenger traffic of that year, whereas the freight traffic, which had no unusual stimulus in that year, felt the full force of the depression that paralyzed business in the fall of 1893 and dropped thirteen billion ton miles, or over 14 per cent. This represented a loss of $129,562,948 in revenue from freight alone. Notwithstanding the increase in passenger mileage in 1894, there was a loss of $16,142,258 in passenger revenue due to the reduction in receipts per passenger mile from 2.108 cents in 1893 to 1.986 cents in 1894.

The average receipts per ton mile also showed a decline from .878 to .860 cent.

Thus in every way the railways were made to feel the effects of the financial storm that swept no less than 119 companies, operating nearly 28,000 miles of line and representing over two billions of capital, into receiverships. Among the important roads that took refuge in the courts from the panic of 1893 to 1896 were the following:

	Miles Owned.	Stock.	Bonds.
Atchison, Topeka & Santa Fe	4,438	$102,000,000	$228,082,000
Baltimore Ohio	531	30,000,000	80,797,000
Philadelphia & Reading	337	41,227,362	160,820,009
Norfolk & Western	1,327	59,500,000	57,669,529
Northern Pacific	2,217	84,238,347	132,376,500
Wisconsin Central	685	11,435,500	10,631,009
Union Pacific Ry.	1,830	60,868,500	85,492,185
New York & New England	360	23,817,600	17,106,373
New York, Lake Erie & Western	543	86,373,600	81,537,168
Toledo, St. Louis & Kansas City	450	17,055,000	10,000,000
Cape Fear & Yadkin Valley	329	1,972,900	4,922,700
Central R. R. & Banking Co. of Ga.	312	7,500,000	26,574,000
Chesapeake, Ohio & Southwestern	351	9,726,000	11,002,628

Note should be made that these figures do not include the operated mileage of the roads named. Neither do they include the capitalization of the subsidiary or leased roads of the several systems.

It may be of assistance to the student to give concrete illustration of the general process through which these rail

ways went through their sea of receivership troubles to the ground of net profits by which alone they can succeed. In the first place, the receiverships of 1893-96 followed the long drain of declining rates as night follows the declining sun. Take the Atchison, Topeka & Santa Fe, for example. Between 1884 and 1894 its average passenger receipts per mile fell from 2.648 cents to 2.264, and its average freight receipts from 1.882 to 1.191 cents. To those unfamiliar with such units it may be explained that on the 385,000,000 passengers carried one mile the decline of .384 cent cost the railway nearly $1,500,000 in 1893, and on the 2,418,000,000 tons of freight carried one mile the decline of .691 cent cost the railway over $16,000,000. No business on earth can stand up under such a continuous depletion of its resources—for fares and rates are the only resources available to a common carrier wherewith to pay wages and other operating expenses, taxes and a fair return on invested capital.

So much for how the Atchison got into a receivership in 1893. When it went into the hands of the court its funded debt was $228,082,000 and its capital stock $102,000,000. In the reorganization that followed the foreclosure sale December 10, 1895, its funded debt had been scaled down to $162,278,050 and its capital stock increased to $213,468,000. The increase in stock was accounted for by the issue of $111,486,000 preferred stock to the holders of old second mortgage bonds amounting to over $90,000,000, on payment of a 4 per cent assessment, and as a bonus to holders of the original stock on whom an assessment of $10 a share was levied. As shares in the old company, for which par had originally been paid, were worth only $13 at the date of reorganization, it required faith to pay the $10 assessment necessary to hold on. It was 1899 before a 2½ per cent dividend was declared on the preferred stock, and 1901 before a 1½ per cent dividend was paid on common stock.

The reader should take note of the preponderance of capital stock over funded debt in this readjustment. It is in the proportion of almost 3 to 2 over funded debt and something

like a proportion of 6 to 5 has been maintained to this day. But it was the men, not the money, that saved and made this great continental line. Aldace F. Walker, who was one of the original Interstate Commerce Commissioners, after acting as one of the Santa Fe receivers, was chosen as Chairman of the Board and, more important still, the Board of Directors selected Edward P. Ripley as President and vested in him almost despotic authority over the management of the property. If ever there was an instance of a beneficent despotism, it was the rule of Mr. Ripley over the Santa Fe from 1895 to his death in harness, in 1920.

Other roads went through the deep waters in 1893-96, from which many emerged with lightened burdens and stronger organizations. But they were not all through with receiverships, as the next chapter will tell.

A chapter could be written on the prevision necessary to the choice of a site for passenger and freight depots in well established communities. In the west the railways generally selected the most convenient location for themselves, and let the communities come up to them. In the east the railways had to take what city councils and township trustees and cost per front foot permitted. The experience of Philadelphia, with its great rail transportation agency, illustrates this feature of railway progress. It was 1858 before the Pennsylvania Railroad had a real passenger station to its name in Philadelphia. This was located way over on the West Side, with a small ticket office at Eleventh and Market. Its next passenger station was erected on Market Street west of the river in October, 1864. In 1876 the approach of the Centennial Exposition spurred the railway officials to the erection of a new station on Market Street and Lancaster Avenue, west of the tunnel junction that was to accommodate not only the Independence multitudes but any crowds that might visit Philadelphia in the next generation. "But," says the historian, "it only required a few years' experience to demonstrate that the West Philadelphia Passenger Station was too small and wrongly placed."

Then they built them a larger and finer station between Broad and Fifteenth Streets, extending south from Filbert Street, which was opened for use in December 1881. Before

BROAD STREET STATION, PHILADELPHIA, 1894

1894 expanding business called for the extension of this station into what is now known as the "Broad Street Station," illustrated herewith, whose days are reported numbered as this is written.

Verily one generation of railway builders cannot foresee what the next generation of railway users will demand.

When the decade 1890-1900 closed, the American people had at their disposal a transportation plant that may be summarized as follows:

Miles of main line	192,556
Miles of second track	12,151
Miles of third track	1,094
Miles of fourth and other track	829
Miles of yard track and sidings	52,153
Miles of all tracks	258,784
Locomotives	37,663

Passenger cars	34,713
Freight cars	1,365,531
Company cars	50,594
Net capitalization	$9,547,984,611
Net capitalization per mile of line	51,092
Net capitalization per mile of track	36,895

At the opening of the decade the equipment of rolling stock with train brakes and automatic couplers was in its infancy. By 1900 practically the entire equipment was fitted with the automatic coupler and 67 per cent was fitted with train brakes. This transformation alone must have entailed an expenditure of from three to four hundred million dollars, or nearly enough to duplicate the entire locomotive equipment of 1900.

Small Return on Invested Capital

In the face of the scriptural injunctions, new and old, that say, "Thou shalt not muzzle the ox that treadeth out the corn," and "the laborer is worthy of his reward," railway regulation in America has inherited the popular disposition to muzzle the railways that literally tread out the corn for nourishment of the people. At no time in their history has the muzzle been loosened from the mouth of American railways, so that they could partake freely of the fruits of their labors.

Since 1890 the Commission has presented an annual resumé of the average return in dividends and interest on the capital invested in American railways. As this seldom finds its way into the public prints, the student may be interested in what it shows as to the per cent of actual return on capital stock at the beginning and close of the seventh American railway decade:

	1890.	1900.
Total Capital Stock	$4,409,658,485	$5,545,579,593
Dividends Paid.	Per Cent Paying Dividends.	Per Cent Paying Dividends.
Nothing paid	63.76	54.34
From 1 to 2 per cent	2.08	2.27
From 2 to 3 per cent	1.50	1.81
From 3 to 4 per cent	2.89	6.10
From 4 to 5 per cent	8.26	14.56
From 5 to 6 per cent	6.69	6.93
From 6 to 7 per cent	6.53	4.29

From 7 to 8 per cent	3.78	6.40
From 8 to 9 per cent	2.40	1.78
From 9 to 10 per cent	.35	.08
From 10 per ct. and upwards	1.76	1.44
Total..................	100.00	100.00

It will be perceived that in 1890 85.18 per cent of all railway capital paid less than 6 per cent and in 1900, a more prosperous year, 86.01 per cent paid less than that dividend. The marked difference in the two years was in the amount of stock that paid nothing and that paid from 4 to 5 per cent.

When it comes to interest paid on funded debt, amounting in 1900 to $5,585,147,047, no less than 87.29 per cent paid less than 6 per cent. Of this 6.78 per cent paid nothing. The largest percentage was 32.82 paying from 4 to 5 per cent. No less than 71.46 per cent of the funded debt paid between 3 and 6 per cent interest.

The return on the capital invested in American railways has never been a burden on American internal commerce.

How the Union Pacific Was Rebuilt

This decade closed with the practical reconstruction of the Union Pacific after the reorganization that followed the receivership in 1893. In this there came to the surface of railway affairs a new and compelling constructive human force in the person of Edward H. Harriman. The romance of the spectacular building of the Union Pacific in a race with the construction of the Central Pacific in the '60s was succeeded by thirty years of alternating periods of plenty and drought, during which, between 1880 and 1890, the able administration of Charles Francis Adams did not prove equal to the task of stemming the current of adverse balances. Mr. Adams made an heroic struggle against adverse circumstances, but unfortunately, as he confesses in his autobiography, "lacked the cleancut firmness" to wring success from heavy odds. When Mr. Adams resigned, in 1892, the road was confronted with the maturity of the Government loan in 1895, and so in the shadow of the financial panic of 1893 it sought shelter from its pressing embarrassments in the hands of a receiver.

After various combinations, including one to which J. Pierpont Morgan was a party, had tried and failed to effect a reorganization, a syndicate headed by Kuhn, Loeb & Company undertook the heavy task. But not until they were joined by Mr. Harriman did they make much headway. He with the backing of the Illinois Central, in which he had earned his railroad spurs, brought to the syndicate the indomitable spirit of personal faith and initiative that has always accompanied the railway miracles on this continent.

The syndicate found the Union Pacific stripped of the unprofitable parasites and feeders that had sapped its immature resources, and it acquired the property by assuming liabilities amounting to over $81,000,000, of which $58,448,223 had to be paid to the Government in full satisfaction of its claims for original advances. Thus was extinguished the debt for guaranteed bonds with interest that had hung over the enterprise from its inception. The syndicate also took over the unsold and practically unsalable balance of the land grants. The road was in poor physical condition and lacked proper equipment when, on January 1, 1898, it was handed over by the receivers to its new owners. In May following Mr. Harriman was elected chairman of the executive committee and from that day the dust of reconstruction never ceased to fly on the Union Pacific. After a hurried inspection, in which, like Rudyard Kipling in other fields, nothing escaped his photographic eye, Mr. Harriman telegraphed a request for $25,000,000 as a starter in rehabilitation of road and equipment. He followed up his wire in person and succeeded in persuading his directors into making the unusual outlay.

How he employed that $25,000,000 in part is worth telling in the picturesque language of Frank H. Spearman, whose basic facts are attested by Chief Engineer Berry, who was in charge of the work:

"It is not perhaps generally understood," says this author, "that the highest barrier presented to the Union Pacific on its transcontinental run lies immediately west of the plains about Cheyenne, where the line strikes that secondary range

of the Rockies known as the Black Hills. What makes the ascent of these hills of especial difficulty is a great elevation coupled with unusually short slopes. Just here, at the outset almost, the Union Pacific rises to its greatest height above the sea, and here, in the rebuilding lay the problem before Berry, chief engineer, as to how the grade of this granite summit might possibly be reduced. New limits had been set to the gradients of the proposed improvements; but it is one thing in a directors' meeting to adopt a grade over the Rockies of forty-three feet to the mile, and quite another to go into the Rockies and run it. The chief engineer had to match his wits against those of engineers who, a generation before, had laid out the pioneer line and done it well. Thirty-five years of reflection, observation and criticism from the best constructionists in the world had failed to develop flaws in this earliest effort to bridge the Rockies. * * *

"To find the line that Berry determined he must have, he sent good men into the hills, only to be told that where he wanted a line there was none. But when they tried to maintain this, the personal equation, that subtle and incalculable factor in men which, in the overcoming of difficulties, makes the slight difference between success and failure, intervened. The chief engineer, undaunted, refused to abide by the findings. He sent the engineers again; the second time they brought the line he knew must be there. It involved staggering estimates. The Dale Creek crossing, just beyond Cheyenne, called for a single fill nine hundred feet long and one hundred and thirty feet deep. In these granite wastes the engineering figures assumed at once unheard of proportions. Cubic yards went into the calculations in millions instead of thousands. Two creek crossings called for eight hundred thousand yards of embankment. Two miles of new line required the moving of seventeen hundred thousand yards of material, and of this three hundred thousand were solid rock. Two fills, within these two miles, swallowed a million cubic yards. To eliminate three heavy reverse curves and two bridges, a summit cut was required eighty feet deep

feet into the air. Before the tunnel could be finished it became necessary to line over seven hundred feet of it with a heavy steel and concrete construction."

Differing in degree, according to the topography of the territory and traffic involved, the work of reconstructing the hastily built mileage of American railways has been prosecuted from the laying of the first rail in Baltimore to the present day with the untiring energy and unstinted expenditure of money and brains that has made them leaders in the transportation world. They closed the three-quarters of a century of railway progress on this continent with 192,556 miles of line and 258,754 miles of all track. In other words, American railways ended the 19th century with enough miles of track to encompass the earth ten times.

Reorganization of Southern Lines

This decade also witnessed a reorganization and consolidation of minor roads south of Mason & Dixon's line that was more or less reminiscent of the process by which the New York Central assimilated the several links in its line from New York to Chicago. The great difference between the two processes was that, while the northern combination was made up of solvent parts, the southern enterprise gathered its parts from the wrecks of 1893 and succeeded in welding them into several of the great trunk lines of the Union.

When the Richmond & Danville Railroad was purchased at foreclosure sale on June 18, 1894, by the Southern Railway Company, freshly organized for that purpose, it was operating a perfect network of minor companies stretching from Washington, D. C., to the Mississippi at Greenville. There were some thirty separate organizations represented in its 3,357 miles of line, operated on pretty much every description of ownership, lease or control. The Richmond & Danville itself was one of the pioneer roads of the South whose organization ran back to 1847.

In swift succession the Southern Railway acquired at foreclosure sales the Charlotte, Columbia & Augusta Railroad;

the Columbia & Greenville Railroad; the important East Tennessee, Virginia & Georgia Railway (operating 1,265 miles); the Georgia Pacific Railway and numerous other lines, so that by September 1, 1894, it was operating 4,429 miles right in the center of what may be called the Old South. Since then it has been gathering into its fold by purchase, lease, control of stock, etc., a host of other roads whose roll call includes more than half a hundred corporate names, operating a total of over 7,000 miles.

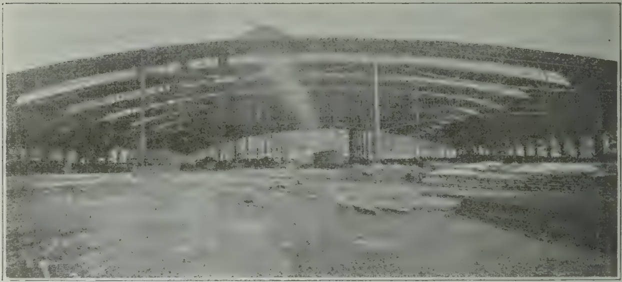
Another consolidation or amalgamation of independent odds and ends of roads going back to the beginning of things in the South is the Atlantic Coast Line Railroad. Its seed-end can be traced to the Petersburg Railroad Company, chartered in 1830 and opened, 60 miles, to Weldon, North Carolina, in 1833 and to the Richmond & Petersburg Railroad, chartered in 1834 and opened in 1835. The title, Atlantic Coast Line, without any details of organization, first appears in Poor's Manual for 1889. In that year a holding company of the same name was incorporated in Connecticut. The nucleus of the present system makes its first appearance in official statistics for 1888 under the title of the Atlantic Coast Association, with a total operated mileage of 837, assembled from no less than thirteen distinct companies, of which the chief was the Wilmington & Weldon Railroad, with 319 miles. The last road traced its genesis back to 1835.

By 1902, through various consolidations and some original construction, the Atlantic Coast Line Railroad found itself operating 3,589 miles of line and had arranged for the purchase of a majority of the stock of the Louisville & Nashville Railroad, which, from a charter running back to 1850, was at that time operating 3,444 miles of line. The Louisville & Nashville had previously acquired a majority of the stock of the Nashville, Chattanooga & St. Louis Railway. So by 1904 these associated roads operated well over nine thousand miles.

Concurrent with these consolidations, and by much the same process of natural selection and amalgamation, came the organization of the Seaboard Air Line Railway in 1900,

Baggage

In no one respect is the superiority, or rather the liberality, of American railway practice better shown than in the way baggage is handled here compared with its treatment in foreign countries. Here it is made an object of special consideration at the carrier's risk, special cars are provided for it and an elaborate system of checks follows it from station



CONSTRUCTION OF TRAIN SHED, ST. LOUIS UNION STATION

of departure to station of destination, and even from private residence or hotel in one city to private residence or hotel 3,000 miles away, and without extra railway charge unless the baggage exceeds 150 pounds.

In England and Europe how different. There the safest thing to do with a trunk that weighs over 150 pounds, the point at which the excess baggage charge begins in America, is to send it by express. In England the charge for 100 pounds for less than 50 miles is 50 cents; between 50 miles and 150 miles, $1.00; between 150 and 300 miles, $1.50, and above 300 miles $2.00 per 100 miles. Moreover, the traveler has to see that his "luggage," as they call baggage in England, is put in the right "van" as it is called there. These high rates and considerations account for the large amount of hand "luggage," suitcases, satchels, carry-alls, Gladstone bags, rugs, etc., with which the typical English traveler preempts

all available space and racks in passenger cars. If he has anything left that necessitates taking a trunk along, he has to identify it at every station, terminal or change of trains. On the continent of Europe, the excess baggage charge begins at 55 pounds and the conditions of shipping baggage and identifying it are even more vexatious.

GRAND HALL, UNION STATION, ST, LOUIS, OPENING NIGHT
—Flashlight Photograph by Atwater.

Exactly when the baggage car as a distinctive unit of passenger train equipment was introduced on American railways has not been definitely settled, but it is generally credited to the Baltimore & Ohio road within the first decade of its history. At first it was little more than a box freight car impressed into the passenger service to carry mail and baggage. Next a passenger car was divided into two sections, one-half with seats for second class passengers or as a smoker, and the other end for mail, express and baggage. A little wood cut in the Great Railway Celebration of 1857 shows a

typical baggage car in its proper place in a train of four cars on the Little Miami Railroad. Where the baggage car of these early days cost from $1,000 to $1,500, by 1920 the cost of a modern steel baggage car had risen to over $12,000, while post office cars of similar construction cost from $20,000 to $25,000 apiece. The artist evidently considered the rearing stallion in the foreground the chief feature of his landscape. Many years were to elapse before the spirited animals took kindly to the snorting iron horse.

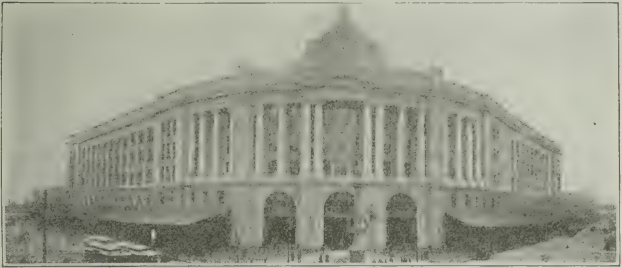
A VIEW OF PENDLETON,
TWO MILES FROM CINCINNATI, AND THE OUTER STATION OF THE LITTLE MIAMI RAILROAD.

It has been estimated that the railways of the United States handle in excess of 150,000,000 pieces of baggage annually of an aggregate value of over $30,000,000,000, which is credible when it is considered that the better class of trunks that endure the strong arm attentions of the express and baggage man cost from $50 apiece and upwards. Their contents are often insured for $200 and upwards. The typical Saratoga trunk has given way to the innovation model, but the sample trunk of the average traveling salesman still maintains its competition with the mail order store, which has necessitated the running of mail freight trains on passenger schedule. The parcel post business has made freight cars out of $20,000 postal cars running on passenger schedules.

The handling of baggage at our great central stations in the summer season has reached colossal proportions, and only the adoption of the most systematic methods and mechanical assistance renders it reasonably efficient. When the vast number and weight of the pieces to be moved with haste and accuracy is considered, the proportion misrouted, delayed, lost and damaged is so relatively small as to be insignificant.

The South Boston Station

Near the close of this decade, five roads entering Boston from the south and west united for the construction and operation of a station that should accommodate their passenger traffic. The new station is located at the corner of Sumner Street and Atlantic Avenue and is owned by the New York, New Haven & Hartford, the Boston & Albany, the Boston & Providence, the New England R. R. Co. and the



"NEW (1898) SOUTH BOSTON STATION"

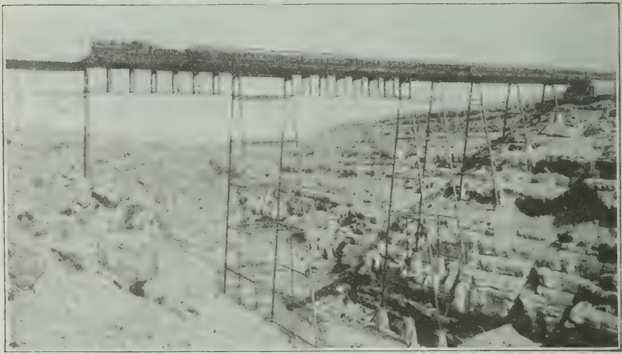
Old Colony roads, the last three being leased to the New Haven. The Boston & Maine, Maine Central, Bangor & Aroostook and their New England connections entering Boston from the North and West are served by the North Boston Station at the other end of the city.

The area of the station is about 35 acres; the train shed is 568 feet wide by 720 feet in length, and covers 28 tracks with a substation for 4 additional tracks. The length of 28 main tracks is 3.58 miles; sidings and yard tracks, 12.46

APPROACH TO SOUTH STATION, BOSTON, MASS.
Note the numerous block signals.

miles; total track, 16.04 miles. The photograph gives a good idea of the signal system necessary to the operation of this station.

A Santa Fe Train on Stilts



BRIDGE OVER CANYON DIABLO, ARIZ.

CHAPTER IX

EIGHTH DECADE—1900-1910

Regulation Becomes More Stringent. Rebates Finally Suppressed. Commercial Valuation of 1904. The Commission Gets Authority to Fix Rates. Earthquakes and Floods

WITH the opening of the 20th century the whole character of this narrative changes from a historical review of railway progress to a record of contemporaneous events. Regulation, which had found the railways practically free agents prior to 1887, had gradually gathered the reins of administration into its hands. From a sort of benevolent supervision of railway affairs through the adoption of a uniform system of accounting; hearing complaints of discrimination in rates and fares and of undue preferences to individuals and corporations; and from pronouncing many tariffs unjust and unreasonable, the Commission had become the central arbiter of American transportation affairs. It lacked only authority to name just and reasonable rates in place of those it found unjust and unreasonable. And this was coming with that certainty that seldom fails the legislative applicant who knows what he wants and will not be satisfied until he gets it. The Commission knew what it wanted. The shippers knew what they wanted. Congress knew what both wanted. So it was only a question of persistent importunity when the authority to fix rates passed from the carriers to the Commission.

GROWTH IN DIMENSIONS OF PASSENGER CAR
1880-1905

Between the passage of the original Interstate Commerce Act, in 1887, and 1900 the field of the Commission's super-

vision had undergone a most remarkable expansion, as the following figures show:

	1890	1900	Increase per cent
Miles of single track	156,404	192,556	23.1
Miles of auxiliary track	9,761	14,074	44.1
Miles of yard track and sidings	33,711	52,154	54.7
Miles of all tracks	199,876	258,784	29.5
Number of locomotives	29,036	37,663	29.7
Number of passenger cars	24,586	34,713	41.2
Number of freight cars	829,885	1,365,531	64.5

The figures in this statement that are especially worthy of the student's attention are those showing the growth of the auxiliary track and yard track and sidings of 44.1 and 54.7 per cent, respectively. These percentages are significant of

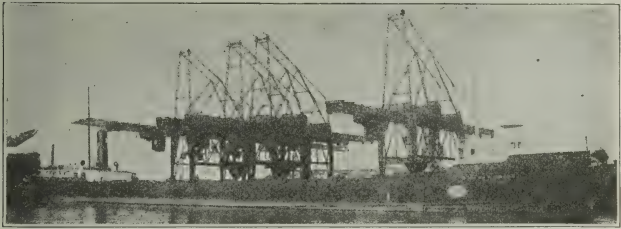
THE LUCIN CUT-OFF OVER GREAT SALT LAKE
Costing Millions and Saving More

the intensive development of railway facilities that has been characteristic of American railways in recent years. Where conditions did not invite extensions into new territory that needed railways without the traffic to support them, the demand for transport facilities along established lines encouraged the laying of double tracks and sidings in the more settled portions of the country. Money was withheld from the stockholders in millions and put back into side tracks, reduced grades and realignments.

A like condition checked the numerical increase of rolling stock. It will be observed that the increase in the number of locomotives in the above statement was practically identical with the increase in miles of all tracks. Taken alone this would not have sufficed to move the concurrent increase of 85 per cent in freight ton mileage and 35 per cent in passenger mileage. This phenomenon was accounted for by an increase

of at least 40 per cent in the capacity of the engines and 65 per cent in the capacity of freight cars. The exact percentages are not available because the weight and capacity of rolling stock was not officially reported prior to 1902. The percentage given are conservative estimates.

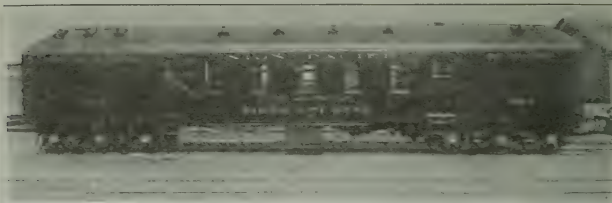
The railways entered the new century with their average receipts both for freight and passengers at the low level of



UNLOADING LAKE VESSELS INTO RAILWAY CARS.

7.24 mills per ton mile and 1.978 cent per passenger mile. The attempt of the carriers to readjust these rates to their mounting expenses in 1900 precipitated the agitation to give the Commission power not only to declare rates unjust and unreasonable but to prescribe what rates should be substituted for them. This agitation once begun, bequeathed from Congress to Congress, was not permitted to falter until the authority was granted by Congress by the Hepburn bill in 1906, which will be considered in its place.

The so-called Elkins amendment to the Commerce Act of February 19, 1903, clarified and strengthened its provisions forbidding special rates, rebates, drawbacks or other device granting undue preference to any individual or species of traffic. By it the publication of tariffs was required in all cases and any practice on the part of the carriers whereby any property by any device whatever was transported at a less rate than that named in the tariffs was prohibited under severe penalty.



ALL STEEL POSTAL CAR—UNION PACIFIC

While this legislation bore the name of Senator Elkins, it was really the consummation of the efforts of railway executives under the leadership of President Cassatt of the Pennsylvania to root up the demoralizing and destructive practices that threatened to involve the entire transportation system in disgrace and disaster. The struggle for competi-

INTERIOR STEEL POSTAL CAR—UNION PACIFIC

tive traffic had forced down the rates paid to a point where none but the strongest companies could earn a living profit. Agreements to maintain rates were the veriest scraps of paper. There was practically no limit to the rebates extorted by the shippers under threat of diverting traffic. The bigger the shipper the larger the rebate. The word "rebate" as applied to the secret return of a percentage of the freight

MISSOURI PACIFIC ENGINE OF 1902
Built by American Locomotive Co.

charge is a happy term for an odious practice in that the true word is derived from the French *rabattre*, to beat down. It literally beat down the railways and smaller competitors. The rebate on freight charges bred discrimination and undue preferences in their most insidious and corrupting form. And, while many large industries prospered by the nefarious practice, the railways, in common with more numerous smaller shippers, suffered proportionately.

Liability to imprisonment for acts for which such punishment had been named in the original Act was expressly abolished by the Elkins Act, thus recognizing that the penalty should apply to the beneficiary, and not its agent. Corporations, having no souls, could not be sent to the penitentiary. This greatly increased the efficacy of the statute.

In its annual report for 1904 the Commission went on record that the branch of regulation that dealt with the publication and invariable application of tariff rates "as amended by the Elkins law of February 19, 1903, appears to be operat-

ing successfully as applied to carriers subject to its provisions." The Commission was greatly encouraged in its fight for authority to prescribe the reasonable rate upon complaint after hearing by a passage in President Roosevelt's annual message calling on Congress to confer on it "the power to revise rates and regulations, the revised rate to go at once into effect and stay in effect unless and until the court of review

BALDWIN SANTA FE TYPE OF 1903
Built for the Atchison, Topeka & Santa Fe—Heaviest type used at that time

reverses it." As the Commission was to be the judge of the facts, the right of appeal was a barren legal ideality.

The Commercial Valuation of 1904

Among the questions involved in the discussion of railway rates and relations to the public, none has caused a wider divergence of opinion than that of the relation of their cost or value to their capitalization. From their inception this has been in dispute. Their capitalization, starting with the humble figures of $15,000 to $20,000 a mile, exclusive of equipment, has gradually advanced until, at the beginning of the eighth decade, the total capital stood at $11,688,147,091, or $61,531 per mile; whereas, eliminating the intercorporate duplication of stocks and bonds, it was only $9,482,649,182, or $49,925 per mile.

This last figure may be compared with $43,781, which was found to be "the mean cost per mile of all the finished

roads in operation" in Massachusetts in 1849 by the standing committee on railways and canals within the commonwealth.

Early in 1902 S. N. D. North, then Director of the Census Bureau, under authority of the Act of March 6 of that year, undertook an appraisal of railway property, and employed Prof. Henry C. Adams, the Commission's statistician, to direct and superintend the work. The attempt to get anything

ILLINOIS CENTRAL FREIGHT YARD IN THE HEART OF CHICAGO. PHOTO OF 1904

approaching a satisfactory valuation quickly proved abortive and Professor Adams, with the assistance of Prof. B. H. Meyer of the University of Wisconsin, now a member of the Interstate Commerce Commission, adopted the rule that the valuation of the operating railway systems "should be arrived at by the capitalization of their true net earnings at a rate to be determined by the market value of their securities." The capitalization was based on net operating income after taxes were paid, and excluded revenue from outside sources. "Only the strictly net earning capacity of the transportation business of the railways was capitalized." The final appraisement was then computed from the mean of the five years ending June 30, 1904.

The rate of capitalization, upon which the whole structure of the valuation rested, was arrived at by Messrs. Adams and Meyer and the method of its determination was explained at length by Prof. William J. Meyers, who subsequently succeeded Professor Adams as Statistician of the Commission. So when the ratio was finally fixed at 4.256 per cent it had behind it as expert official authority on railway accounting as could be found in the United States.

As announced in Census Bulletin 21 by Professor Adams:

"The commercial value of railway operating property in the United States computed for the year 1904 was $11,244,852,000, or $52,600 per mile."

For the same year the net railway capital of the same railways was $10,711,794,078, or $52,099 per mile.

How the "Commercial Value" as reported by Professor Adams was apportioned among the states is shown in the following table from Census Bulletin No. 21, with the taxes paid by the railways in the respective states for the same year:

State	Commercial Value of railway operating property as of June 30, 1904	Average Value Per Mile	Taxes Ad Valorem 1904
United States	$11,244,852,000	52,500	$61,649,474
Alabama	150,211,000	32,200	761,666
Arizona	68,356,000	39,000	222,357
Arkansas	124,626,000	30,200	613,752
California	350,694,000	56,000	1,720,860
Colorado	198,261,000	39,800	1,325,962
Connecticut	105,369,000	103,500	1,123,124
Delaware	17,285,000	51,500	21,388
District of Columbia	5,578,000	174,300	28,150
Florida	80,467,000	22,600	503,320
Georgia	156,603,000	24,800	874,092
Idaho	91,877,000	62,900	342,911
Illinois	805,057,000	69,300	4,792,986
Indiana	375,541,000	54,300	3,057,204
Iowa	344,847,000	35,000	2,046,751
Kansas	356,356,000	40,400	2,436,986
Kentucky	155,772,000	47,900	1,051,156
Louisiana	123,401,000	31,600	727,398
Maine	80,146,000	39,600	411,891
Maryland	132,342,000	93,100	468,810
Massachusetts	250,052,000	118,000	1,589,497
Michigan	277,597,000	32,100	2,560,699
Minnesota	466,734,000	59,800	1,937,139
Mississippi	107,884,000	31,000	541,900
Missouri	309,768,000	40,200	1,509,291

Montana	196,209,000	60,100	680,353
Nebraska	263,170,000	45,200	1,285,793
Nevada	43,745,000	44,300	344,603
New Hampshire	79,786,000	62,500	391,595
New Jersey	333,568,000	146,400	1,694,045
New Mexico	86,400,000	34,500	284,073
New York	898,222,000	108,300	4,651,307
North Carolina	113,146,000	27,800	667,596
North Dakota	123,390,000	38,700	683,644
Ohio	689,797,000	75,000	3,956,164
Oklahoma	78,668,000	30,100	291,471
Oregon	75,661,000	43,600	333,861
Pennsylvania	1,420,608,000	128,900	4,735,018
Rhode Island	25,719,000	121,400	197,437
South Carolina	75,500,000	23,800	467,230
South Dakota	49,646,000	16,300	306,449
Tennessee	131,166,000	37,700	824,049
Texas	237,718,000	20,100	1,222,583
Utah	90,325,000	50,800	367,996
Vermont	37,311,000	35,100	153,346
Virginia	211,315,000	53,700	1,127,696
Washington	182,837,000	54,500	754,569
West Virginia	201,799,000	71,000	549,286
Wisconsin	284,510,000	40,400	1,900,027
Wyoming	100,307,000	80,400	203,377
Indian Territory	79,405,000	31,400	48,318

Although this valuation has the defects and glaring inequalities inseparable from the method adopted by Professors Adams, Meyer and Meyers, yet in the final result it is as worthy of acceptance as any attempt to appraise such a vast and complex property as the railways of the United States can be. An appraisal that gives to the railways of Wyoming a value of $80,400 per mile, with South Dakota set down at $16,300, does not carry conviction from any inherent plausibility. But on the whole the aggregate valuation of $11,244,852,000 receives strong support from the *ad valorem* taxes collected from the railways in 1904. These, including some $16,000,000 where the tax was levied on gross earnings or some other basis, amounted to a rate of approximately .55 per $100 compared with .74 per $100 of estimated true value as computed by the Census Bureau in 1902.

If the adult student or school boy will take an arbitrary ratio of 5 per cent instead of the 4.256 per cent of Professor Adams and apply it to the net operating income of Federal return without deductions, he will get as near the commercial

value of the railways as the three able and conscientious professors did in 1904. Only, and this is all important, he must pick a normal year and not the mean of any five or

TUNKHANNOCK CREEK BRIDGE—DELAWARE, LACKAWANNA & WESTERN R. R.
—It is built of concrete, 2,200 feet long, 240 feet above the creek bed and has twelve semicircular arches

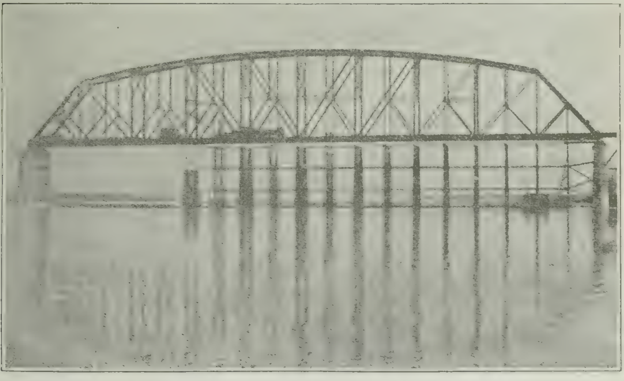
ten years with numerous deductions. By including the lean year ended June 30, 1915, an average Federal return of $940,000,000 was arrived at. This would have yielded a so-called "Commercial Value" of approximately $18,800,000,000 which may be compared with the official valuation of $18,900,000,000 certified by the Commission in 1920. Applied to the railway situation in 1920 the methods and ratio adopted

by Professors Adams, Meyer and Meyers would have reduced the "Commercial Value" of the railways to nothing, along with the net operating income which was less than nothing

FAST MAIL 1904—TAKEN AT 80 MILES AN HOUR
—*Green, Photographer*

that year. Applied to the net operating income of 1916 it would have supported a valuation of over $23,000,000,000.

And so the "Commercial Valuation" of 1904 serves the useful purpose of furnishing a *reductio ad absurdum* for kick-



720-FOOT SPAN OF BRIDGE OVER OHIO RIVER NEAR PADUCAH, KY.
This span was built on timber falsework partly removed when picture was taken—It is the longest simple truss ever built.

ing out of court all such valuations resting on the fluctuations of traffic, rates and wages or stock exchange quotations. The wind that bloweth where it listeth is no more fickle than the elements upon which net railway operating income depends. Any such valuation is absolutely worthless for rate fixing purposes, for it depends on the ratio as related to wages, which represent over 60 per cent of the cost of operation.

NARROW GAUGE GIANT OF 1876 AND ITS SUCCESSOR

To this extent the Commercial Valuation of 1904 was worth the space given it in this history.

Commission Gets Power to Prescribe Rates

By what is known as the Hepburn law, approved June 29, 1906, the Commission finally got what it had been seeking for many years, authority to prescribe just and reasonable rates in place of those which after complaint and hearing it had pronounced unjust, unreasonable or discriminating. Although in its twenty-first annual report of December, 1907, the Commission testified that the law had been accepted by railway managers in good faith, who had shown a sincere disposition to conform to its requirements, little immediate progress was made toward the effective enforcement of the Hepburn amendment. This followed the filing of suits questioning the right of Congress to delegate to any tribunal authority to establish an interstate rate.

No sooner had the Commission secured the approval of its authority to prescribe rates under the Hepburn law than it renewed its recommendation to Congress for the extension of its authority to prohibit the taking effect of the advance of rates or a change in regulations or practice by a carrier until the matter had been finally heard and determined by the Commission. With the enactment of the so-called Mann-Elkins Act of 1910, the Commission was finally clothed with almost absolute authority over the rate-making phase of railway management. Not only was it authorized to suspend the operation of proposed changes in rate schedules until their propriety had been investigated, but the Act imposed upon the carriers the "burden of proof" to justify the proposed rate advances.

The first effect of this legislation, gathering the reins of both regulation and revenues into the hands of the Interstate Commerce Commission, was to put the brakes on railway extension and construction, as the following statement of the number of miles built in the five years preceding and following the passage of the Hepburn Act in 1906 shows:

Railway Construction

Before		After	
Year	Miles	Year	Miles
1902	6,026	1907	5,212
1903	5,652	1908	3,214
1904	3,832	1909	3,748
1905	4,388	1910	4,122
1906	5,623	1911	3,066
Five years	25,521	Five years	19,362

This showing is serious enough, but it would be more impressive if the year 1907 had been shifted to the constructive period and 1912 and 1913, with a total of 6,068 miles built, had been added to the period after the Hepburn Act became really operative. Then the totals for the two periods of six years would have been 30,733 and 20,222, respectively.

Between these six-year periods the average freight receipts of the railways dropped from 7.62 mills per ton to 7.50 mills and that apparently small difference cost the rail-

BUILT FOR BALTIMORE & OHIO R. R. IN 1904
Weight loaded Engine and Tender 474,000 lbs.

ways approximately $180.000.000 in freight receipts, or $30.000.000 a year. Its paralyzing effect on railway construction was the most serious effect of tightening the bonds of regulation.

The Panic of 1907

But astringent legislation and regulation were not the only adverse elements in the railway situation as it developed in the fall of 1907. For the fifth time in eight decades they were caught in the maelstrom of a financial panic. Their early projects were postponed by the monetary crisis of 1837, caused by land speculation and "wild cat" banking; this was

BALDWIN ATLANTIC TYPE 1906
Fast Passenger Service

followed by the financial depression of 1857, resulting from much the same causes; then came the panic of 1873, attended by the suspension of specie payments, following the failure of Jay Cooke & Company and the depression of 1893, for which impending tariff changes and the fear of silver legislation were held largely responsible. On each of these occasions the railways were involved to such an extent that building operations were suspended, as their credit suffered in common with the banks and trust companies. The financial crisis of 1907 came upon the railways out of a clear sky. For the ten years 1897 to 1907 the railways had enjoyed a period of unprecedented extension and prosperity. In that time their gross earnings, expenses and net income had more than doubled, as the following statement shows:

Year	Revenues (thousands)	Expenses (thousands)	Net Income (thousands)
1897	$1,122,089	$ 752,524	$326,428
1898	1,247,325	817,973	386,215
1899	1,313,610	856,968	410,305
1900	1,487,044	961,428	477,284
1901	1,588,526	1,030,397	507,185
1902	1,726,380	1,116,248	555,667
1903	1,900,846	1,257,538	585,459
1904	1,975,174	1,338,896	574,582
1905	2,082,482	1,390,602	628,406
1906	2,325,677	1,599,443	714,103
1907	2,589,105	1,748,515	760,278
Increase per cent	130.7%	132.3%	132.9%

In the meantime the railway pay roll had increased from $465,601,581 to $1,072,386,427, or 130.3 per cent; and 85,962 miles of track had been added to the facilities for carrying the ever-expanding volume of American traffic. Moreover, the freight rates had decline from 7.98 mills to 7.59 mills per ton mile.

So it was in the very heyday of their usefulness that the panic of 1907 overtook American railways. Where their revenues for that October were $250,575,757, by February 1908, they had dropped to $161,085,085 and the earnings for the calendar year 1907 fell from $2,621,288,809 to $2,322,831,233, a loss of nearly $300,000,000, or over 11 per cent. By prompt and drastic retrenchment, less than $100,000,000 of this loss was carried to net income. But that retrenchment fell heav-

ily on the pay roll, which was reduced from 1,672,074 to 1,458,244 in 1908, or nearly 18 per cent. The cut in compensation, however, was not proportional, being only slightly over $20,000,000, or less than 2 per cent. The difference was accounted for by an advance of 5 cents a day per employe. The recovery of the country and railroads from this panic was not complete until 1910.

STEEL PASSENGER CAR 1907 WEIGHT 105, 500 lbs.

Floods and Earthquakes Test the Railways

From their inception the railways of America had to face perils by storm in all seasons and by disastrous floods when spring unlocked the accumulated snows of winter. Built along the winding watercourses of the continent, their tracks were often only a few feet above normal high water mark and therefore were exposed to washouts and destruction whenever Mother Nature saw fit to let loose torrential rains among the hills and mountains. West of the Mississippi are many rivers that are fit for concrete paving part of the year, but down which raging torrents rush at other seasons and without always waiting for the calendar. "A mile wide and six inches deep," as a cynic has described them, but liable to death-dealing convulsions. The Mississippi itself is a tricky stream and has played many mad pranks with its levees and banks, the railways ranking among the first and often the heaviest sufferers.

But it was left for the year 1906 to furnish a diversion in the way of a convulsion of Nature that was to involve the railways in the dual role of sufferer and rescuer. On April 18 of that year San Francisco was visited by a series of violent earthquake shocks. The quake itself would not have destroyed any considerable part of the city. But it started fires in several widely separated sections and the fractured and

BALDWIN DECAPOD TYPE OF 1906
Built for Pennsylvania R. R.—Weight engine and tender 582,100 lbs.

dislocated water mains left the fire department without adequate means of controlling the flames. For three days these raged unchecked and were finally stopped only by means of water from the bay pumped through a tandem line of fire engines connected by long sections of hose. Meanwhile the whole business heart of the city and a large part of the residential section, covering all told more than five square miles, had been reduced to ashes or smoldering ruins. Something like 200,000 persons were rendered homeless and the property loss was appraised at $325,000,000.

The railways suffered in common with the inhabitants of the smitten city, but it was given to them to play a most beneficent role in the rescue work, in bringing shelter to the houseless and removing the homeless and hungry to neighboring communities where there was welcome shelter and abundant food. The resources of both the Union Pacific and the Southern Pacific systems were put at the service of the city. On the first day of the disaster Vice-President E. E. Calvin of the Southern Pacific bought $20,000 worth of food

in Los Angeles and rushed it to San Francisco by special freight running on passenger time. It reached there in time to preserve the inhabitants of the still smoking city from experiencing the pangs of hunger for a single day. In the first 24 hours after the earthquake the so-called Harriman lines moved 1,073 carloads of refugees to the country and on the next day as many more. Fortunately, both quake and fire spared the ferry house at the foot of Market Street and there the railways made their headquarters the Mecca for the distressed and half-dazed populace that declined transportation to happier scenes. In his report Vice-President Calvin said that between April 18th and May 23d the two roads brought into San Francisco *free of charge* 1,603 carloads of supplies, at a cost of $445,410, and carried out 224,069 refugees, whose fares, if they had been paid, would have amounted to $500,831.

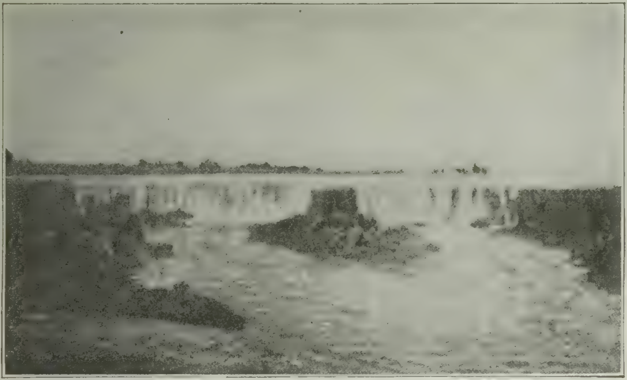
This record of Good Samaritan work is told here because it is a replica, only under different circumstances, of what railway companies have been quick to do in every community visited by fire, flood, tornado or crop failure. These very words bring the names of Chicago, Johnstown, Louisville and Kansas to mind. As willing rescuers they have played the part of first aid to the injured in every state in the Union. About the only echo of this splendid work in San Francisco to find its way into national recognition is the following note referring to the compensation of employes in the official Statistics for 1906: "This figure does not include the amount paid by the Southern Pacific Company, which by reason of the fire that occurred in San Francisco in April, 1906, lost many of its records and was thus unable to make a complete report in this regard."

But the bears of the stock exchange in New York did not fail to take toll of the calamity. The psychological tremor that struck San Francisco was felt across the continent and shook more than a billion of market value out of railway securities. Between April 17 and May 20 the shares of the leading companies sold off all the way from 6 to 48 points.

Industrial stocks showed their sympathetic sensitiveness to anything affecting the railways by even greater losses.

Saving the Imperial Valley

To the majority of school children, as well as their elders, the term Imperial Valley means little more than a rich section of the great State of California famed for its glorious climate and golden harvests, agricultural and mineral. The real Im-



FLOOD WATERFALL IN IMPERIAL VALLEY, CUTTING BACK

perial Valley is one of Nature's most interesting phenomena. Here is a depression in the earth's surface about 100 miles long and 35 miles wide that was once covered by water to a depth of 400 feet in its deepest part. Once it was the northern end of the Gulf of California, and the Colorado River poured its flood of water and silt into its eastern shore. In time the silt formed a barrier clear across the gulf and left its upper stretch a great salt water lake. Slowly the California sun sucked up the water, at the rate of five or six feet a year, leaving nothing but an arid basin known as the Salton Sink. There are evidences that through the ages the Colorado River frequently broke through the barrier it had cre-

ated and the gulf flowed back into its ancient banks, only to have the process of exclusion renewed by the fickle river.

Early American explorers who crossed the Sink found nothing there but a hot, waterless desert, apparently the bottom of a dried up lake. None of them realized that it was far below the level of the Pacific Ocean. Not until 1891 did the idea of irrigating the Salton Sink with fresh water from the Colorado River find lodgment in some adventurous minds. But the company that attempted to execute the idea went

THE MAN AND THE JOB
Facing the Problem of a Flooded Empire

bankrupt in 1893. The project languished for nearly ten years, when it was renewed, a canal was dug from the Colorado at Pilot Knob, nearly opposite Yuma, and the boastful name "The Imperial Valley" was substituted for the ominous sounding "Salton Sink;" 400 miles of irrigating ditches were dug and water was available for 100,000 acres more of irrigable land.

It was but another story of American adventure and energy waving the wand of unwavering will above a seeming impossible situation and seeing it blossom as no rose ever blossomed before.

Then enter the railway. A branch of the Southern Pacific was built through the valley. By 1904 more than 10,000 settlers were on the ground, numerous town sites were laid out, the capacity of the canals and irrigating ditches was quadrupled and by January, 1905, 120,000 acres of reclaimed land were under actual cultivation. The land was so rich in varied elements that it would literally produce almost any-

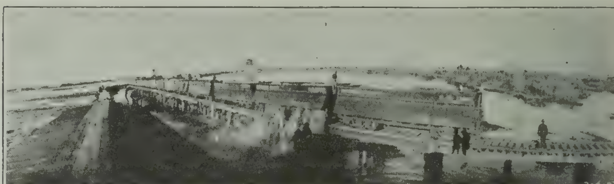
thing. Nowhere on earth was Nature more bountiful. The air of the valley was so dry that men worked in a temperature of 120 in the shade without exhaustion. The title "Imperial Valley" was justified in the abundance and variety of the crops.

But the Colorado River had to be reckoned with. What it had done ages before it could do again. And it proceeded to wreak its will. In 1904 the silt from the Colorado, such as had dammed out the waters of the gulf from Salton Sink,

THE RIVER STILL RAMPANT
Contemplation gives place to action

gradually clogged up the canal that was furnishing the lifesaving irrigation to the valley. So the engineers of the California Development Company started to cut a new intake from the river. The Colorado River took advantage of the failure to provide this intake with a head gate control, to start serious trouble. In February, 1905, it began operations with its first flood of the season, which passed without doing any damage. Shortly after followed another flood and that, too, passed. But the flood that came along in March was something different. The spring sun in the mountains was behind it and it started to enlarge the size of the intake. At first the breach was only sixty feet wide, and the engineers tried to close it with piles, brush and sandbags. These were swept away by another flood. The crevasse was widened from 60 to 160 feet and the river was flowing into the valley at the rate of 90,000 cubic feet per second. It quickly overflowed the banks of the main canal and soon, in the words of Mr. George Kennan, "a new Salton Sea was in process of formation."

Right here is where a railway—this time the Southern Pacific—was called in to save a prosperous community from being drowned out or driven into the desert wilderness surrounding the oasis. It loaned the development company $200,000 to help control the river. But this was pronounced insufficient by the engineer, Epes Randolph, who said the ultimate cost "might easily run into three-quarters of a million dollars."



DUMPING MILLIONS OF DIRT AND DOLLARS INTO THE SALVATION OF SALTON SINK

"Are you certain you can put the river back into the old channel?" telegraphed Mr. Harriman.

"I am certain it can be done," replied Mr. Randolph.

"Then go ahead and do it," wired Mr. Harriman.

And so the battle was on.

The Gulf of California lay only 100 feet below the broken intake, the bottom of Salton Sink was 300 feet lower. The engineers sought to deflect the river by a jetty, but it failed. By the construction of a 600-foot barrier-dam the flow was lessened and hopes were high that the worst was over. But on the last day of November a flood carrying masses of driftwood came down the Gila, a tributary to the Colorado, and increased its discharge from 12,000 to 115,000 cubic feet per second. The dam disappeared, the crevasse widened to 600 feet and nearly the whole river poured into the valley, forming a lake with a surface area of 150 square miles.

At this point it became a question of self-preservation for the railway. Its main line "was almost awash." If the river could not be controlled before the spring freshet, 60 miles

of Southern Pacific track would be submerged, the splendid work of irrigation would be undone and the Imperial Valley would become a fresh water lake. Engineers and contractors were at their wits' end for means to avert the impending disaster, that grew every hour as temporary plans proved futile. The crevasse had grown to a quarter of a mile in width and "the Colorado was pouring into the Salton basin more than 4,000,000,000 cubic feet of water every 24 hours."

On April 19, the day after the San Francisco earthquake, the Southern Pacific took full charge of the defensive operations. But before it could begin to stem the flood, the summer freshet arrived, doubled the width of the break and poured a resistless avalanche into the valley. At its height the Colorado carried 75,000 cubic feet of water and silt per second, or 6,000,000,000 cubic feet every 24 hours, into the valley. The main line of the Southern Pacific was quickly inundated, and the inhabitants were fleeing to the mountains from a lake that rose seven inches a day over a territory covering thousands of acres.

On August 6, when the summer flood had passed its peak, the work of damming the crevasse was begun. The railway company recruited a motley camp of Mexicans and 2,000 Indians from six tribes and with all its road building resources sought to divert the water while erecting control gates. But the river once more proved too much for the mortals and the work of four months of labor and an expenditure of $122,000 was swept into the valley.

The men engaged in this struggle with riotous Nature were of the stuff that may be down but is never out. They redoubled their efforts, added a thousand more men and seven hundred horses and mules to their little army, and proceeded to dump rock and gravel and clay into a massive levee half a mile long across both intake and crevasse. Checked at this point, the wily water started a flank movement 1,200 feet farther south and in less than three days the whole river was pouring down the 400-foot slope into the Salton Sea.

Then it became evident that no temporary dike would afford protection from the Colorado River in its riotous moods,

and it was decided to build a great rampart along the west bank of the river for at least twenty miles. This it was estimated would cost approximately $1,500,000 and the railway company had already spent as much to no purpose. At an additional cost of fifty or sixty thousand dollars it could move its track out of danger. The temptation to abandon the Imperial Valley to its sink was almost as resistless as the raging river.

MAN TRIUMPHS AND THE IMPERIAL VALLEY IS SAVED

In this emergency Mr. Harriman laid the whole situation before President Roosevelt. The President responded by wiring for fuller information as to what was proposed. On December 15th Mr. Harriman advised him that if work was begun at once engineers said the break might be repaired for $300,000 to $350,000, and the Southern Pacific would co-operate with its train service, tracks, switches and quarries. Then ensued telegraphic quibbling over responsibility, past and future, ending by the Southern Pacific undertaking to repair the break, trusting to the Government for assistance.

So the fight was resumed. Trainload upon trainload of small stones and rocks as large as flat cars could handle were dumped from a trestle into the crevasse, to be followed by gravel and smaller material to knit the whole into a solid mass. Finally, as this rose, the water passing over the dam lessened and began to seek its own channel, and by February 10, 1907, the gap was closed tight and the Colorado flowed once more in its old way to the gulf.

To make the future of the Imperial Valley safe for future generations of agriculturists, an unbroken line of dikes was

constructed for a dozen miles near the river, shutting it off from the lowlands to the west.

All told, the Southern Pacific spent $3,100,000 in the preservation of the Imperial Valley and, although Congress was urged by two Presidents—Roosevelt and Taft—to reimburse the company in some measure for "coming to the rescue of the Government at the instance of President Roosevelt in a great emergency," as Mr. Taft phrased it, the claim has never been honored. A majority of the House Committee on Claims reported a bill appropriating $773,000 in January, 1911, but it got no farther. The claim is still unpaid at this writing.

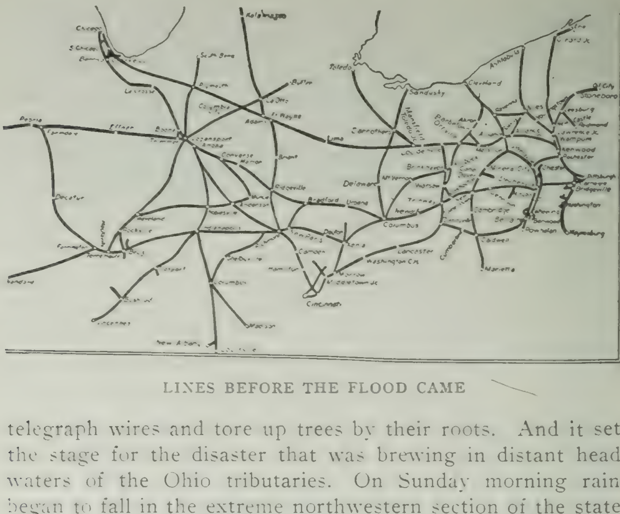
In 1916 it was claimed that the farmers of the Imperial Valley expected to earn a sum equivalent to interest on $500,000,000. For the week ending July 5, 1924, over 14,000 carloads of cantaloupes were shipped from the valley.

In this splendid piece of rescue work the Southern Pacific simply added to the long list of sacrifices American railways have made for the communities they serve only to experience the traditional ingratitude of republics. But the Imperial Valley, with its teeming inhabitants and industries, is a splendid monument to the intrepid American spirit that has conquered and settled this continent from the Atlantic to the Pacific.

The Ohio Flood of 1913

Out of its place in this brief chronicle the flood that swept down the watersheds of the Muskingum, the Scioto and the Miami, tributaries of the Ohio, in the spring of 1913 gives another glimpse of the perils the elements hold over the railways. In the early days of March the valleys of these rivers were peopled by as happy and prosperous a community as was to be found in the United States. Cities, towns, villages and farm buildings dotted the landscape in every direction. Between Wheeling to the east and Indianapolis to the west rose such well-known cities as Columbus, Dayton and Zanesville. The school boy, with a string representing a hundred-mile radius on any map with Columbus as its center, can get a fair idea of the territory in Ohio alone whose inhabitants

went to sleep on March 20 without dreaming that anything could or would happen to disturb the physical security of their lives. The dwellings and their grounds were sodden with the moisture of a wet winter. There was nothing particularly alarming when a severe wind storm swept eastward over the state on Friday, March 21. Wind storms in March are no unusual occurrences even in the peaceful valleys of Indiana and Ohio. It did a lot of damage to telephone and



LINES BEFORE THE FLOOD CAME

telegraph wires and tore up trees by their roots. And it set the stage for the disaster that was brewing in distant head waters of the Ohio tributaries. On Sunday morning rain began to fall in the extreme northwestern section of the state and continued for the next four days to deluge the whole state eastward to the Pennsylvania line. In that time an average for the whole state of between 7 and 8 inches fell, ranging from nearly a foot at Bellefontaine down to 2.7 inches at Marietta, nearly 150 miles away. The student can visualize what that means by taking the area of Ohio, 40,740 square miles, or slightly more than four times that of Lake Erie (9,960). This would give a rainfall in these fateful four days equal to a lake the size of Lake Erie 2½ feet deep.

This was no tideless lake; but a resistless current, obeying the law of gravitation and seeking by hundreds of creeks and rivers to find its way to the Ohio River, whose banks were not high enough or far enough apart to carry it off. Nothing built by men, of iron, steel or concrete, could withstand it. It swept embankments and abutments away as if they had been built of bubbles, seen for a moment, then vanishing into the universal wreck of debris.

SMITH STREET STATION, CINCINNATI, OHIO

In round numbers, 22,000 houses were destroyed and 35,000 were seriously damaged by the water. Zanesville boasted a flood mark 15 feet above the previous high record, until Delaware, just north of Columbus, came to the surface with a claim of 15 feet 7 inches above its previous record.

In Dayton it was reported from the high tower railway depot that the only dry spots in sight were the National Cash Register buildings and grounds.

When the rain ceased and the waters subsided into their accustomed channels, they left a deposit of mud and slime over the devastated area from an inch to a foot and a half in depth.

Words cannot begin to picture the extent of such a dis-

aster. How it overwhelmed the transportation system of that region can be judged from two skeleton maps of the Pennsylvania Railroad showing its system in the territory before and after the flood. It cost this one road $3,019,240 to restore its lines, besides an indefinite loss in interrupted traffic. What happened to the Pennsylvania was the common lot of the New York Central "Big Four," Erie, Baltimore &

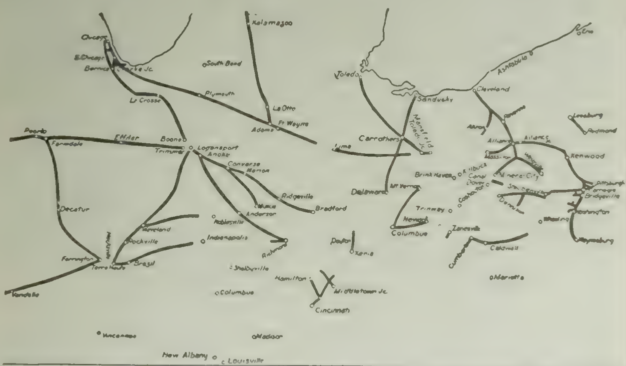
PENNSYLVANIA BRIDGE OVER MUSKINGUM RIVER, ZANESVILLE, OHIO

Ohio, Hocking Valley, Wabash and other roads serving the flooded district. In such a calamity Nature plays no favorites.

Governor James M. Cox estimated that a million and a quarter inhabitants were affected by the flood and that the direct money loss was over $300,000,000. The fatalities accompanying this disaster have never been definitely stated. One estimate places them at 444, including a number in Indiana and Illinois, for the torrential rain extended over a great part of those states. It is probable the number exceeded 500 dead and missing.

Intercorporate Relations of Railways

In March, 1908, after nearly two years of diligent investigation, the statistician of the Commission, Prof. Henry C. Adams, made public his report on the "Intercorporate Relationships of Railways in the United States." In collecting and compiling the data for this report Professor Adams had the assistance of Mr. W. J. Meyers, subsequently statistician of the Public Service Commission of the Second District of



RAILWAYS AFTER FLOOD HAD COME AND GONE
Mark the universal dislocation of the lines

New York and of Mr. Frank H. Dixon, from 1910 to 1918 chief statistician of the Bureau of Railway Economics. As a result of their joint industry they found the outstanding net securities of the railways in the hands of the public were as follows:

	Amount	Per mile
Funded debt	$ 7,842,400,969	$36,173
Stock	4,743,049,585	21,877
Total securities	12,585,450,554	58,050

This finding excluded from the securities having any claim upon the revenues of the railways all railway holdings from outstanding capital. It resulted in a reduction in the amount

generally accepted as the measure of the claim of such capital on revenues from $67,936 per mile of line to $58,050—a decrease of practically $10,000 per mile. It was submitted to the Commission with the remark that:

"This report makes public for the first time a correct statement of the portion of securities outstanding in the hands of the public."

Unofficially the Bureau of Railway News and Statistics had computed the outstanding railway securities in the hands of the public upon which returns from revenues were claimed during the three years that this investigation was pending, as follows:

1906	$57,966 per mile
1907	57,425 per mile
1908	58,664 per mile

Owing to intensive construction of auxiliary tracks, sidings and yard tracks and the decrease of miles of line through abandonment, the net securities in the hands of the public per mile of line has increased in 1923 to $76,734.

Two Cents a Mile Passenger Legislation

Contributing to the distress of the railways in 1907 was the action of the legislatures or commissions in twenty-two states placing a limit on passenger fares. In a majority of these states the maximum named was 2 cents a mile, and wherever by reason of special conditions it was 2½ or 3 cents those conditions called for higher fares.

Previous to 1906 it was estimated that the approximate cost of running passenger trains was a dollar a mile—exact figures then as now being incapable of determination because from 25 to 30 per cent of all operating cost is common to freight and passenger service. In 1906, the year when most of these reductions were ordered, the average number of passengers in a train, for the entire country, was 49 and for the three territorial groups chiefly affected it ran: Group III (Ohio, Indiana and Michigan), 44 to the train; Group IV (Virginia, West Virginia, North and South Carolina), 36 to

the train, and Group VI (Illinois, Iowa, Wisconsin, Minnesota and portions of the Dakotas), 43 passengers to the train. By multiplying these figures by 2 cents the student will perceive that they fall short of the operating cost per train mile from 12 to 28 cents. In Group IV, 3 cents a mile was barely sufficient to meet the expense of operation.

As the passenger train mileage in these three groups in 1906 was upwards of 183 million, it will be seen that an average fare 12 cents a mile below the cost of operating those trains would amount to nearly $22,000,000. Happily, a majority of the states refused to follow such a destructive policy, and before our entry into the Great War the density of passenger traffic had overtaken the cost of operating trains.

However, the 2-cent passenger legislation preceding the panic of 1907 added to its adverse effect upon the railways. The trail of the panic as shown in the official list of receiverships, 1907 to 1910, was as follows:

	Companies	Miles operated
June 30, 1907	29	3,926.31
June 30, 1908	52	9,529.03
June 30, 1909	44	10,529.80
June 30, 1910	39	5,237.03

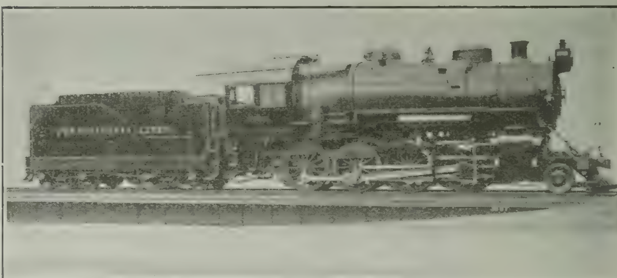
It is worthy of record here that the question of a reasonable passenger rate was threshed out before the Railroad Commission of Wisconsin in the case of Buel vs. the Chicago, Milwaukee & St. Paul Railway. One of the commissioners was B. H. Meyer, now of the Interstate Commerce Commission. After an exhaustive review of the whole field it was decided that 3 cents a mile for intrastate travel in Wisconsin was excessive and that a charge of 2½ cents should be substituted for it.

With the close of the decade, daylight was beginning to show ahead of the companies that had been hardest hit by the depression and its attendant difficulties of 1907.

Effect of Panic on Rolling Stock

In no other department of railway operation was the effect of the depression of 1907 more instant and far reaching than in the provision that has to be made for handling the peak

of freight traffic. Throughout the year there had been an average shortage of freight cars, running as high as 140,000 in February. This was gradually reduced until, in August, there was a small surplus. By October the shortage had risen again to 86,811. In the face of the slump in business that occurred toward the end of that month, the shortage shrank to 44,802 in the following month, to be succeeded by



BALDWIN CONSOLIDATION TYPE 1910
Heavy Freight built for Pennsylvania R. R.

a surplus of 208,586 in December. From that point on for 56 months, with two exceptions, surpluses were reported, rising as high as 413,338 in April, 1908. Nothing to equal this accumulation of idle freight cars had ever occurred on American railways. With a temporary break, the condition was to prevail until 1916. Its effect upon the construction of new freight equipment was immediate and paralyzing, as the following statement of cars built during the five years before and after the panic shows:

Freight Cars Built

	Before the Panic		After the Panic
1904	60,806	1908	76,555
1905	165,155	1909	93,570
1906	240,503	1910	180,945
1907	284,188	1911	72,161
Four years	750,652		423,231
Av. per year	187,663		105,808

While it is a well-established fact that the life of a freight car averages between 20 and 25 years, and therefore there is a call for the replacement of about 100,000 freight cars a year, this table demonstrates that in the four years 1908-1911 barely enough cars were built to take care of the retirements from age, decrepitude and destruction. Except for the spurt in building in 1910, which was encouraged by the partial recovery in revenues in 1909, the building of cars for those years would have fallen below the minimum of provision for increased traffic.

In passing it is worthy of note that between 1908 and 1918 there was an increase of only 284,692 freight cars in service, or 13.5 per cent, where the freight handled increased nearly 90 per cent, the handling of the greater traffic being made possible by an increase in the average capacity of freight cars from 34 tons to 41 tons and in trainloads from 357 tons to 655 tons. To make this possible the weight of locomotives on drivers had been increased from an average of 71 tons to 91 tons. In tractive power, locomotives in the meantime had risen from about 25,000 pounds to 34,000, or about 36 per cent.

A clear comprehension of these statistics as they relate to the equipment in the decade 1900 to 1910 is necessary to a thorough appreciation of how the railways rose to meet the great emergency of the following decade. Their lack of preparedness dates back to the Hepburn Act of 1906 and the panic of 1907. They were put on a starvation diet and forced to eke out the small surplus of funds and equipment they had been permitted to accumulate previous to that most fateful period in their history.

The Farmer and Railways' Share of the Consumer's Price.

Regarding the railroad and the farmer's share of the consumer's cost Secretary of Agriculture James Wilson, in his report for the year 1910, made the following division:

	Percentage of Consumer's Price		
	Farmer	Railway	All other
Milk	50	7.0	43.0 (a)
Butter	50	0.5	49.5
Eggs	50	0.6	49.4
Apples	50	6.8	43.2
Beans	50	2.4	47.6
Potatoes	50	7.4	42.6
Grain (all kinds)	50	3.4	46.6
Hay	50	7.9	42.1
Cattle and hogs	50	1.2	48.8
Live poultry	50	2.2	47.8
Wool	50	0.3	49.7

(a) Received mostly by the retailer.

To which the Secretary adds, "The foregoing allowances for freight are to be increased by one-half when the farmer receives about three-fourths of the consumer's price;" and he adds that "it is plain that the cost of distribution from the time of delivery at destination by the railroad to delivery to the consumer is the feature of the problem of high prices which must present itself to the consumer for treatment."

In another part of the report the secretary says: "The railroad, generally speaking, adds a percentage of increase to the farmer's prices that is not large." Without straining a seam he might have said that it is an amazingly small price for the indispensable service rendered.

The Detroit River Tunnel

Elsewhere has been told how the New York Central secured its Michigan Central connection with Chicago by bridging the Niagara River in 1855, but in doing so it had to ferry the Detroit River at Detroit. That break in locomotion —trains being ferried intact—was not overcome until the ferry was rendered obsolete by a tubular tunnel through which trains were hauled by electric locomotives. Regular freight and passenger service was inaugurated October 16, 1910, four years having been required in its construction. This involved engineering of novel features because of its magnitude. Where the giant tubes were to be laid the Detroit River is over half a mile wide and 50 feet deep at some places. It has an uneven bed over which the current runs at a speed of

two miles an hour on the surface and about half as fast at the bottom. The problem was to build two great single track tubes and lay them on or rather in a graded bottom so that they would resist pressure from all sides. In order to do this the right of way under the river had to be dredged to an even surface, 74 feet below the surface at the lowest point. The tubes were constructed in sections 260 feet long five miles

DETROIT RIVER TUBULAR TUNNEL
Sinking Section No. 10, August 4, 1909.

above their submerged beds. When this was done they were floated on great pontoons to the proper place and sunk with the utmost exactitude, so that they formed a single continuous tube from Canada to the United States. This was accomplished and the result is said to be drier than the land on either side.

The tunnel and approaches measure 12,800 feet or more than 2⅓ miles.

For engineers the designing, construction and placing of this great tubular, subaqueous tunnel presented numerous and interesting features which cannot be adequately dealt with outside of a technical review. The pontoons containing the

tubes were launched sideways and floated down to their destination. But great concrete anchorages had to be sunk to hold them steady during the process of sinking them into the ditch that had been dredged for them.

The interior radius of the tubes was 23 ft. 4 inches, being lined with 20 inches of reinforced Class A concrete and encased in solid Class B concrete, so that the two parallel tubes are imbedded in what is practically a solid rectangular block

CANADIAN APPROACH TO DETROIT RIVER TUNNEL

of concrete. The space between this and the side of the ditch is filled with the replaced river clay, so that the whole tunnel as it stands is a part of the solid bottom of the river.

When laid there was no variation in the level of the tunnel and only a negligible variation in alignment—so accurately had everything been calculated and exactly constructed. Where the river is deepest the top of tunnel is slightly above the bottom of the river and had to be protected by riprap.

In service the tunnel has developed no structural defects and, being operated electrically, is free from smoke and foul air.

Rise and Fall of the Commerce Court

On June 18, 1910, President Taft signed an amendment to the Interstate Commerce Act creating a Court of Commerce, with jurisdiction possessed by Circuit Courts of the

United States in all cases of the kinds specified in the Act. These related specifically to the enforcement of orders of the Interstate Commerce Commission. The court was composed of five judges, with the rank and pay of United States Circuit judges with an allowance of $1,500 for the extra expense of living in Washington, D. C. Martin A. Knapp was taken

CONCRETE LINED INTERIOR OF DETROIT RIVER TUBULAR TUNNEL
Seventy-four Feet Under River Level at Lowest Point.

from the Commission to head the new court, and his associates were men of eminence and experience at the bar and on the bench in the states from which they hailed. The new court attacked the duties to which it was assigned with commendable enthusiasm and ability that evoked both approval and criticism, as its decisions went for or against the shippers and carriers concerned.

Hardly was the court fairly under way before an agitation was started for its abolition, which found such favor in Congress that a repealing clause of the Commerce Court Act

was included in the legislative, executive and judicial appropriation bill in June, 1912. This was made an additional reason for President Taft's veto of that bill. In his message the President said that he could not find a single reason for the arguments advanced for repeal why the court should be abolished "except that those who propose to abolish it object to certain of its decisions." "Next to impartial and just judgment," he continued, "the great desideratum in judicial reforms today is the promotion of the dispatch of business and the prompt decision of cases. The establishment of the Commerce Court has brought this about in a substantial way by reducing the average delay from two years to six months, and I doubt not that as time goes on and the procedure becomes better understood this period of six months will be further reduced. It is greatly in the interest of the shippers and therefore of the public that the means of reducing the time of remedial litigation against railroads should be preserved."

The veto was sustained and a new bill, with the Commerce Court provision omitted, was passed over another veto. However, the Commerce Court was abolished by an amendment to the urgent deficiency bill approved October 23, 1914. Thus was lost to the public a laudable attempt to put litigation growing out of the regulation of American railways upon a sensible and expeditious basis.

Mr. Acworth on American Railways

Just before sailing for England, Mr. William M. Acworth, the widely known international authority on railways, after a two months' tour of inspection of the railways in 1910, gave the results of his observation, as follows:

"I have been somewhat surprised to see the space that has been given in your newspapers to the criticism of your railways. It has been my opinion that in actual economy of operation the railways of the United States are first in the world. In the number of tons per car, cars per train; in the fullest utilization of locomotives; in the obtaining of the

greatest measure of result for each unit of expenditure, they are not equaled by the railways of any other nation. When the Greek commanders after the battle of Salamis voted who should receive the prize for valor each put his own name first, but all put the name of Themistocles second. And Themistocles received the prize. So, too, though German, French and English railway men would, I dare say, put their railways first in efficiency, they would all, I am sure, put yours second, and on the voting of the experts your railways would come out first.

SIR WILLIAM M. ACWORTH
Whose death since first publication was a great loss to the railway world.

"But further, your nation as a whole is not in other matters pre-eminently efficient. No one would say that your farmers were more efficient than those of France and England, or that your government is more efficient than the government of Prussia. Your railways have reached a higher standard in international comparison than your farmers or your government and under greater difficulties, for in England and on the Continent employment with a railway company is a prize and a man hopes to remain in the service of the same company throughout his life. He is, therefore, obviously more amendable to discipline than the shifting and often even foreign force employed on your railways.

"The investors of Europe and even your own Wall Street seem hardly to grasp the enormous amount of money that must be spent upon railroads to keep pace with your growing traffic. If your traffic doubles every ten years, as it substantially does, you will need not perhaps to double your facilities every ten years, but to increase them at least 50 per cent.

The eleven hundred millions per year specified by Mr. Hill as necessary for this purpose is none too much. The inhabitants of your Western and Southern States, your people in general, must understand that this capital cannot be obtained in their own communities.

"Texas and Oklahoma have no money to spare for railroad building. They want it all for their own local business. Even the East cannot find all the money required. This money in large measure must for a long time to come be raised abroad; and the investors of other lines will not be willing to subscribe it so long as there is a continuance of the harassing conditions which tend to impair the revenues of your railways, to hamper their administration and to retard their development. If the railways of the United States could reach a time when state legislators ceased from troubling and state commissioners were at rest, it would in my thinking be good for the railways and still better for the citizens of the United States."

Earlier in the decade (1903) another Englishman, this time Sir Neville Priestley, under-secretary to the Government of India, Railway Department, made an official report on the condition of American railways. After spending months in the country studying the subject, he made an exhaustive summary of the situation, in the conclusion of which he bore the following testimony to his interesting and instructive experience:

"The railways of America are commercial undertakings on a gigantic scale, and are operated under conditions which are to be found nowhere else in the world, since they receive no protection from the State, and have had to fight their way to the front by sheer ability of management. * * * Many of their methods are different, often startlingly different, from those one has been brought up to believe the only correct method; and it is not until one realizes that the one idea in the mind of American railway men is to 'get there,' and that they do 'get there' by the shortest and quickest way, and do not allow themselves to be turned aside either by red tape,

old-time prejudices, tradition, or any other of the bogeys by which older countries are assailed, that one understands how the results have been obtained which one sees there. * * * That their methods are not always perfect is what might have been expected; but they have managed to do what no other

434,500 lb. ENGINE OF 1910.
Built by Lima Locomotive Works for Baltimore & Ohio R. R.

country in the world has done, and, that is, carry their goods traffic profitably at extraordinarily low rates notwithstanding the fact that they pay more for their labour than any other country."

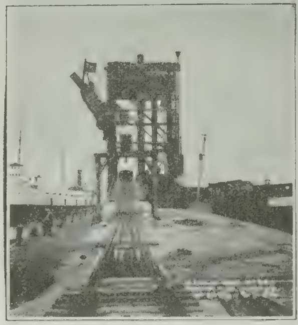
When the student gets that fact into his head—that American railways have been built, maintained and operated by labor paid not only more but double that paid in any other country, except Canada (and Canada is in the same boat)—he will begin to take a just pride in what his fellow countrymen have achieved on this continent.

CHAPTER X

NINTH DECADE—1910-1920

INADEQUATE RETURNS. HIGHER INTEREST AND TAXES. BUILDING OF MONUMENTAL STATIONS. RAILWAYS AND THE WORLD WAR. FEDERAL CONTROL AS AN EMERGENCY MEASURE.

WITH the opening of the ninth decade of railway development in the United States the struggle between the conflicting views of their regulation and management became more intense In the public mind generally the idea prevailed that the best results were to be obtained by subjecting their administration more and more to the regulating hand of the Interstate Commerce Commission; whereas in railway circles and in the financial centers, from which they had to draw the sinews for growth and extension of facilities, there was hesitation that was reflected in the rate on railway borrowings.



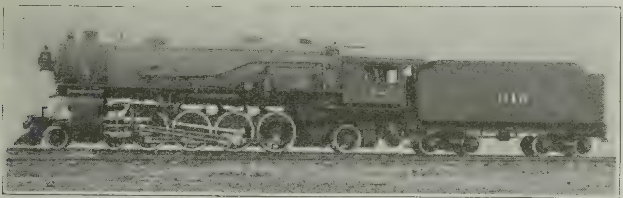
CLEVELAND, O., DOCK CO., CAR DUMPER

Previous to 1900 for a generation the railways had been able to borrow a majority of their new funds at less than 4 per cent. In that year they raised $215,039,851 for new construction at an average of 3.75 per cent. Between January and June 30, 1908, they borrowed $266,281,355, but by this time the average was 5.04 per cent and it has been above 5 per cent ever since—all except gilt-edge securities of that denomination selling at a discount. Today it is only the low rate on early issues of long term securities that holds the average on the aggregate indebtedness of American railways

down to 4½ per cent. The borrowings in 1923 for new construction ranged from 5 to 6 per cent, running as high as 7 per cent on some short term securities, and the Commission has authorized loans at as high as 8 per cent.

The attitude of the Commission was well stated by the late Franklin K. Lane, then Commissioner, in deciding the Western Rate Case in February, 1911, denying advances. In concluding, he said:

"We do not say that the carriers may not increase their income. We trust they may, and confidently believe they



AMERICAN LOCOMOTIVE CO. ENGINE OF 1911
Built for the Chesapeake & Ohio Ry. Weight, loaded Engine and Tender 493,000 lbs.

will. If the time does come when through changed conditions it may be shown that their fears are realized, or approaching realization, and from a survey of the whole field of operations there is evidence of a movement which makes against the security and lasting value of legitimate investment and an adequate return upon the value of these properties, this Commission will not hesitate to give its sanction to increases which will be reasonable. It is the law that rates shall be just and reasonable, and alike to all for like service."

The trouble with that decision, as with so many other decisions not only of the Commission but of the carriers themselves, was that it mistook a spring shower for a crop-producing rain. "It now appears probable," said Commissioner Lane earlier in his opinion, "that at the end of the fiscal year 1911 the carriers here involved will in the main enjoy earnings as high as those they had in 1910—the highest year in their history."

The Commissioner's anticipations were doomed to disappointment. While the earnings held up fairly well, the expenses outran them, so that the net operating income and operating ratio for the three years 1910-12 made the following showing:

	Net Income	Operating Ratio, including taxes
1910	$824,242,000	70.06
1911	766,398,000	72.54
1912	750,187,000	73.62

Not until 1913 did the net income equal that of 1910 upon which the denial of advances was predicated, and by that time

SMALLEST AND LARGEST LOCOMOTIVES IN THE PHILADELPHIA & READING SERVICE

wages, expenses and taxes had got out of hand, so that net income in 1914 shrank to $706,175,000 and in 1915 to $728,212,000, while the operating ratio had risen to 76.83 and 75.37 per cent, respectively. Prior to the Great War, an operating ratio, including taxes, above 70 per cent meant that it was time for the railways to hang out storm signals. With the war and Federal control advancing rates, this ratio without taxes was advanced to 75 per cent, and with them to approximately 80 per cent.

Up to 1910 about the only official investigators whose valuations kept pace with the growth of American railways were the assessors and taxing bodies. Between 1890 and 1910 railway taxes more than trebled. They rose steadily from $31,207,000 to $103,795,000, or 232 per cent in twenty years, where their capitalization had not quite doubled and their revenues from operation had increased only 161 per cent.

To understand what is essential to the successful and pro-

gressive operation of the railways of the United States as a system, the student must have in his mind some fixed formula that will insure a net return of at least 6 per cent on the capital invested or valuation found by competent authority, plus at least 2 per cent additional to provide for additions, betterments and improvements and the credit necessary for extensions. Besides a surplus must be maintained to take care of

WHERE TRAIN AND LAKE FREIGHTER MEET AND EXCHANGE FREIGHT MECHANICALLY

lean years as sure to come as night follows day. As a concrete illustration of what such a formula should provide, the following distribution of the gross earnings of the railways in the fairly successful year 1910 may be accepted as a reasonable standard:

	Amount	Per cent of Revenues
Maintenance of Way	$ 360,999,868	13.33
Maintenance of Equipment	407,700,524	15.06
Traffic Expenses	55,176,869	2.04
Transportation Expenses	905,404,200	33.44
General Expenses	65,177,264	2.40
Taxes	103,435,985	3.82
Total Expenses	1,897,894,710	70.09
Int. on Funded and Unfunded Debt	359,313,649	13.27
Rent of Leased Road	123,976,236	4.58
Dividends and Surplus	326,614,395	12.06
Total Return on Investment, etc.	809,904,280	29.91
Total Operating Revenue	2,707,798,990	100.00

Whatever the operating revenues may be, some approach to the percentages of this table for the railways as a system is necessary to their maintenance to the standard of service required for the United States. War wages and rates will necessitate an adjustment of these percentages on a basis of

ASHTABULA, O., DOCK CO. CAR DUMPER

75 per cent for expenses and taxes and 25 per cent for return on investment and surplus. Under the item "Dividends and surplus" has been included the appropriations for betterments, deficits of weak companies, reserves and surplus. But the attention of the student is particularly directed to the fact that the total of $809,904,280 denominated "return on investment" amounted to over 5.90 per cent on the net railway capital cost of $13,710,570,171 in 1910. In 1911 the Interstate Commerce Commission reported the investment in road and equipment, without any deduction for accrued depreciation, as $15,612,378,845. With adequate expenditures for mainte-

nance, there should be no such charge as "accrued depreciation." A properly maintained railway provides for better and better public service day by day. The thrifty maxim of American railway management sets aside a dollar for betterments to every dollar for dividends and the railway regulation that does not make due allowance for improvements out of rates does not fulfill its duty to the American people.

Effects of Restrictive Legislation

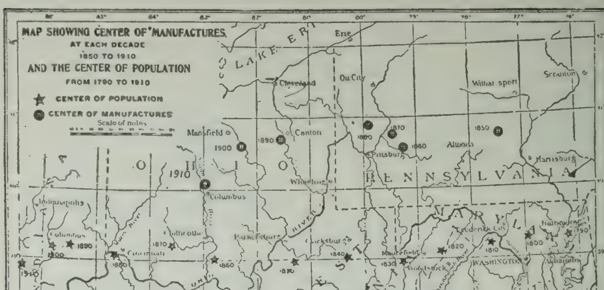
By 1910 the combined effects of advancing costs of material and labor and the restrictive policy of regulation, state and national, had reduced the railways to the state of Caesar when he cried: "Help, Cassius, or I sink." No study of American railways at the opening of the ninth decade in their history is worth while that does not include a brief review of the conditions confronting them. Between 1900 and 1910 everything entering into their operation had advanced in price, whereas the one thing they had to sell—transportation—was fixed, and with a slight advance in 1901 was practically stationary. During this period the range of receipts per ton and passenger mile was as follows:

Year	Per Freight Ton Mile (mills)	Per Passenger Mile (cents)
1900	7.29	2.003
1901	7.50	2.013
1902	7.57	1.986
1903	7.63	2.006
1904	7.80	2.006
1905	7.66	1.962
1906	7.48	2.003
1907	7.59	2.014
1908	7.54	1.937
1909	7.63	1.928
1910	7.53	1.938

It will be perceived that during the decade 1900 to 1910 American shippers and travelers enjoyed the full advantage of stable rates and fares—a condition essential to sound industrial development and social intercourse. Behind the slight advance in freight receipts shown for 1901 lies the fact that the average for that year marked the recovery from the

low record of 1899 incident to the attempt of the railways to advance rates without consulting the Commission.

Turning to the other side of the ledger, which shows the steady increase in everything entering into the production of railway service, the thoughtful student will have no need of spectacles to appreciate what confronted railway management in 1910. The chief items of cost in railway operation are labor, fuel, metal and lumber. The following statement gives



CENTER OF POPULATION 1790 TO 1910

the prices for the commodities relatively to a basis of 100 for the decade 1900 to 1910:

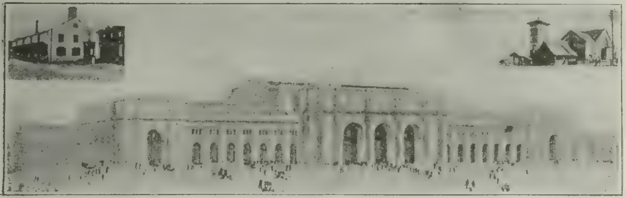
Year	Labor	Fuel	Metals	Lumber	All Commodities
1900	102.4	120.9	120.5	115.7	110.5
1901	101.2	119.5	111.9	116.7	108.5
1902	102.4	134.3	117.2	118.8	112.9
1903	105.9	149.3	117.6	121.4	113.6
1904	109.0	132.6	109.6	122.7	113.0
1905	109.6	128.8	122.5	127.7	115.9
1906	109.6	131.9	135.2	140.1	122.5
1907	115.0	135.0	143.4	146.9	129.5
1908	118.0	130.8	125.4	133.1	122.8
1909	118.9	129.3	124.8	138.4	126.5
1910	120.3	125.4	128.5	153.2	131.6

These increases, which any other industry would have added to the selling price of its product, increased the operating expenses of the railways in 1910 by approximately \$250,000,000. It was this condition that moved the railways to apply to the Commission for the increase in rates in 1910

which was denied in February, 1911, in two decisions in what are known as the Eastern and Western rate cases. These decisions were predicated on a misapprehension as to railway profits in which dividends were counted twice and the optimistic anticipation of heavier traffic referred to above. The increased traffic did not materialize, but the advance in expenses did, so that 1911 and 1912 showed a marked shrinkage in net income.

Building of Monumental Stations

In marked contrast with the declining rate of railway construction in the early days of this decade was the demand



THE NEW PASSENGER STATION AT WASHINGTON, D. C.
SHOWING THE ABANDONED STATIONS

for more extensive and expensive terminal facilities. Not only had traffic outgrown the provisions for its convenient and economical handling, but there was an insistent demand for larger and more pretentious passenger depots. Railway managers had quite generally resisted this pressure on the ground that it involved heavy outlay for sentimental and non-productive improvements. But the public would not be denied and the close of the preceding decade saw the railways embarked on terminal programs that yielded such results as the Union Station at Washington, the Pennsylvania and the Grand Central stations at New York, the Chicago & North Western Station at Chicago and the Union Terminal Station at Kansas City. Only the war put a temporary stop to the tearing down of ancient landmarks to make way for modern monumental terminals. Moreover, many of the landmarks

UNION PASSENGER STATION, WASHINGTON, D. C.
—as photographed by Schutz

were not so ancient and none of them had exceeded the Biblical limit on the age of man, even by reason of strength.

There were noteworthy passenger stations in the United States before 1910—for instance, the South Station at Boston,

TRACK LAYOUT, UNION STATION, WASHINGTON, D. C.
Note "Tunnel" Under Station for Southern Connections

the Union Station in Baltimore, the Lackawanna Station at Scranton, the La Salle Street Station at Chicago, the Union Station at St. Louis and others of lesser dimensions, but the big five above mentioned, thrown open within a period of five years, marked an important advance in railway terminal archi-

TRAIN CONCOURSE, WASHINGTON STATION
—Schutz Photo.

tecture truly noteworthy. In the adaptation of modern steel construction to the track facilities of great passenger terminals they worthily represent the progressive spirit of American railway management. They are beautiful examples of the builder's art and engineering skill without any sacrifice of the public use which is their first excuse for being.

Taken in the order of their completion, the Union Station at Washington replaces the several terminals that for many years were unworthy of our national capital.

As early as 1901 Congress passed an Act providing for the building of a union terminal passenger station to take the

place of the obsolescent ticket offices and train sheds that had served to welcome and speed visitors to the national capital for over sixty years. This Act as amended in 1903 provided for the connection and concentration of the existing lines entering Washington from the several points of the compass into a common terminal a few blocks north of the Capitol.

MAIN CONCOURSE, WASHINGTON STATION
—Schutz Photo.

The Washington Terminal Station

The work of constructing and operating this consolidation was entrusted to The Washington Terminal Company, in agreement with the Baltimore & Ohio Railroad and the Philadelphia, Baltimore & Washington Railroad, a subsidiary of the Pennsylvania. It was to be for the joint use of the named companies, the Southern Railway, the Washington Southern Railway, the Chesapeake & Ohio Railway and such other companies as might be admitted to the use of its facilities and connections. The revenues and expenses of the terminal were

to be divided between and charged separately against the tenant companies in proportion to the use each made of the properties, respectively, as agreed upon.

Under the Act of Congress all other existing stations were required to be abandoned, together with the tracks approaching thereto. Trains approaching the station from the south

TRAIN SHEDS, WASHINGTON STATION

—Schutz Photo.

came in through a tunnel passing under the station building.

The Station proper is a fine specimen of railway architecture and has the advantage of fronting on a semi-circular open space across Massachusetts Avenue. Noble as are its proportions, they have already been taxed when the people of the Union descend upon their capital for some special event.

It is the only Passenger Station in Washington and affords direct connection between lines from all sections of the Union.

The Washington Terminal was completed and opened on November 17, 1907; and therefore should be credited to the preceding decade.

The Pennsylvania's New York Station

The magnitude of the Pennsylvania Railroad's contribution to the monumental edifices of the world is not visible to the spectator who merely admires its classic proportions occupying the Manhattan blocks bounded by 31st and 33d streets and 7th and 8th avenues. It begins far out on the New Jersey shore at Harrison, where steam power is ex-

THE PENNSYLVANIA PASSENGER STATION NEW YORK
Fronting on 7th Avenue

changed for electrical, crosses the Hackensack Meadows, passes under the Hudson at a depth of 97 feet, emerges into the sunlight at 10th Avenue, enters the Main building and then reverses the proceeding under the East River to reappear on the Long Island shore. But the description of the enginering features of this vast undertaking would require a separate chapter to do them justice, and few of the thousands who annually enter New York through the Bergen Portal on the Jersey side realize the vision, skill, unerring

calculations and millions expended to secure such an entrance into the heart of Manhattan Island. The mere acquisition of the territory, two blocks wide, from 7th to 10th Avenue, required years of negotiation before the work of demolishing the buildings crowded upon it prepared the way for dynamiting the rocky chasm for the laying of the tracks and the foundation for the station proper.

PENNSYLVANIA'S NEW YORK PASSENGER STATION TRAIN CONCOURSE

The reduced illustration of the station will give a better idea of its vast proportions and the beauty of its Doric facade on 7th Avenue than many pages of letterpress. It has a frontage of 430 feet on the avenue and a depth of 784 on the streets. The average height above the street is 69 feet, with a maximum of 153 feet to the top of the roof over the main waiting room.

All told, the station and yards have an area of 28 acres, in which are 16 miles of track. The storage tracks will hold 386 cars. The length of the 21 standing tracks in the station is 21,500 feet. Between these tracks are eleven passenger platforms, with 25 baggage and express elevators. The highest point of these tracks is nine feet below the sea level. The

maximum capacity of all the tunnels running into the station has been placed at 144 trains per hour.

The northern side of the station, running along 33d Street, has been assigned to the Long Island Railroad with separate entrances, exits, ticket offices, etc., to accommodate its large suburban traffic, which already taxes its capacity.

MAIN WAITING ROOM
Pennsylvania's New York Passenger Station

This station was opened for traffic in September, 1910, nine years having elapsed from the grant of the franchise by the city of New York.

Chicago Station of the Chicago & North Western

June 4, 1911, saw the Chicago & North Western Railway Company enter into possession of the first truly modern passenger station in Chicago. Its location and construction involved the transfer of the road's passenger terminal from the north side of the Chicago River to the west side of the

south branch of the same unique stream that flows inland from its mouth and finally mingles with the Mississippi a few miles above Alton by way of the Illinois River. The first station of the Chicago & North Western, or, more strictly speaking, of the Galena & Chicago Union, with which it was consolidated, as told elsewhere, was on the west side of the

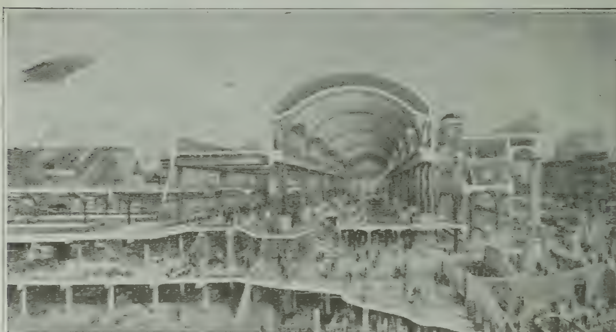
CHICAGO & NORTHWESTERN PASSENGER STATION, CHICAGO

north branch. The second station, built in 1852, involved a move across this branch to the north side of the river proper at Wells and Kinzie streets. The river was first spanned by a swing bridge which in 1908 was superseded by a one-leaf double track jack knife that lifted its head 200 feet in the air to let small boats by. It was the congestion of traffic by this obstruction that finally determined the location of the new station.

This choice involved the acquisition of right of way for six blocks through an industrial section of Chicago and it is not surprising to read that this feature of the undertaking alone entailed an expenditure of $11,560,000, or almost half the cost of the entire work. The station building and train shed cost $6,380,000. The total cost, including elevated approaches, was approximately $23,750,000.

The station building proper faces 320 feet on Madison Street by 218 feet on Canal and Clinton streets. Its walls

are of gray Maine granite, as are the six 40-foot columns that mark the fine Doric portico on Madison Street. While the general outlines of this worthy addition to the world's great passenger stations can be studied in the accompanying illustrations, its details, as they embrace nearly everything that the public demands and the railway has to furnish in a metropolitan terminal, will be of interest.



CROSS SECTIONAL VIEW, CHICAGO & NORTHWESTERN STATION

In the main lobby of the station, entrance to which may be by the portico just mentioned or through spacious doors on Canal and Clinton streets, are located the ticket offices information bureau, telephone booths, travelers' supply and drug stores, telegraph offices, lunch room, cab and motor car offices, lost and found department and the parcel checking room. North of the lobby extends a most complete department for checking "In" and "Out" baggage. Under the train shed farther north is the Canal Street Station of the United States Post Office, to which mail is carried direct from trains by means of an endless chain belt between the tracks. The elevated tracks form a covered way over Washington and Randolph streets.

The main waiting room, which is reached from the lobby by numerous elevators and stairways, in addition to the grand

central staircase, is architecturally described as embodying the idea of a Roman atrium; that is to say, it is a spacious interior court lighted mainly from above, and opens into other rooms on one or more levels. Its sides are finished in Tennessee marble of a delicate light pink shade, and the columns which support the high vaulted roof are of green Cipo-

TRACKS ENTERING TRAIN SHED
Chicago & Northwestern Passenger Station Chicago

lino limestone. The ceiling is of self-supporting tile construction, with ribs of terra cotta, ornamented with symbolic signs. The whole tone and effect of this atrium are restful. On the west end of this court are found the main dining room and a separate waiting room for ladies. At its east end are the barber shop, news stand, smoking room and public and pay toilets.

Opening out of the main waiting room, through numerous doors, lies the train shed concourse across the entire width of the building, and beyond, still to the north, are the train platforms for sixteen tracks. The concourse is separated from

the train shed by a glass partition and can be heated in winter to a temperature of 60 degrees.

In minute attention to the comfort and convenience of travelers this station resembles a great modern hotel, except in the absence of sleeping apartments. Noteworthy are the provisions made for the shelter and handling of immigrants.

TRAIN SHEDS
Chicago & Northwestern Passenger Station Chicago

The accommodations specially set apart for them would be considered fully satisfactory by the average cosmopolitan tourist. The station, which appeared enormously roomy when opened, already shows signs of congestion at certain hours and on special occasions. It handles thousands of suburbanites and through passengers daily and illustrates how almost impossible it is to anticipate the growth of American passenger traffic.

The North Western Station, with its terminal yards, covers eight acres and includes nearly three miles of track. Six years were required in its construction, including the

acquisition of the right of way. Some idea of the value of the property on which this terminal has been erected may be gained from the fact that it had to pay $50,000 for a lot 80 by 80 feet, or the equivalent of $4,224,000 per mile, and $365,000 for an irregular plot containing 28,000 square feet at the rate of $6,864,000 per mile of right of way 100 feet

MAIN WAITING ROOM, CHICAGO & NORTHWESTERN PASSENGER STATION, CHICAGO.

wide. Since the war property in the vicinity of this terminal has more than doubled in value.

Grand Central Station, New York

The history of providing a passenger station on Manhattan Island for the New York Central Lines and the New Haven Lines has been one of tearing down, moving uptown and building greater, only to find in a few years that they were not great enough. It is hard for the present generation

EVOLUTION OF GRAND CENTRAL TERMINAL

NEW YORK CENTRAL LINES, NEW YORK

In Front of Old [illegible] Street Station

[illegible] 4th Avenue and 26th Street, 1857—Present site Madison Square Garden

First Grand Central Station, 1871—Prior to Remodeling, 1900

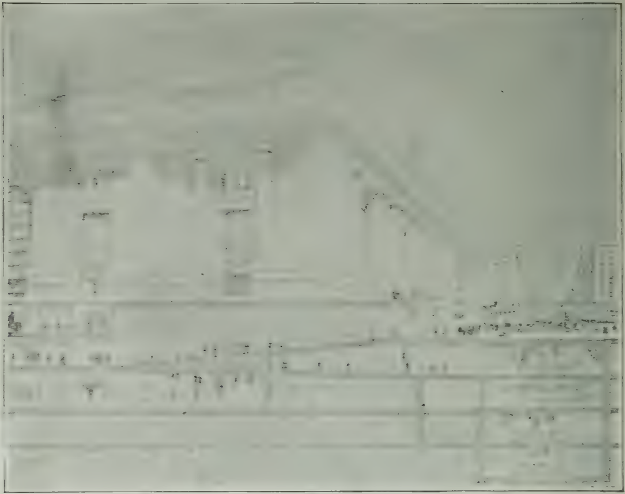
to realize that less than a century ago the first passenger terminal of these lines was on Chambers Street facing on City Hall Square. Its first move was up Fourth Avenue to 26th Street, the present site of Madison Square Garden. This served the metropolis from 1857 to 1871, when the Grand Central Station on 42d Street, facing down 4th Avenue, was

GRAND CENTRAL TERMINAL, NEW YORK
From the Street Level, 42d and Vanderbilt Ave.

built, only to be remodeled and greatly enlarged in 1900. It was of this station when originally finished, in 1871, that Commodore Vanderbilt said that it would accommodate all the railroad business coming into New York for fifty years to come and that it would be his best monument. Scarcely was the proud boast out of his lips before it was necessary to build an addition to accommodate the rush of travel, and before forty years were up his monument and its extensions had been torn down to make way for the present colossal

monument—not to one man, but to the irrepressible genius of American railway progress.

The accompanying illustrations must serve for any attempt to describe the completeness of this solution of the modern terminal requirements of a vast railway system. Nothing in the design and execution of this wonderful enterprise exceeded in difficulty, from every point of view, the problem of operating without interruption the through and suburban trains of two great railroads while tearing away their old tracks and foundations and reconstructing far beneath them the foundations for the new and greater trackage. It was a marvel of engineering genius that added another amazing achievement to the record of American railway building.



CROSS SECTION GRAND CENTRAL TERMINAL NEW YORK
Showing Subway Site. The Bridge is over 42d Street

To the reader who delights in the tabulation of concrete information, the following figures will be of interest:

Total area of old terminal	23	acres
Total area of new terminal	79	"
Area of express train level	46.4	"
Forty-two tracks, express level, length	19.5	miles
Platforms, express level, length	5.8	"
Area, suburban level	52.8	acres
Twenty-five tracks, suburban level, length	14.1	miles
Platforms, suburban level, length	2.5	"
Total tracks, length	33.6	"
Total platforms, length	8.3	"
Average depth of excavation, mainly in rock	50	feet
Height above street level	150	"
Length of station, street level	672	"
Width of station at street level	310	"
Length below street level	745	"
Width below street level	455	"
Depth below street level	45	"
Total weight of steel work	118.597	tons
Capacity of old terminal	306	cars
Capacity of new terminal	1,053	"
Capacity outbound concourse	15,000	persons
Capacity inbound concourse	8,000	"
Capacity of waiting rooms	5,000	"
Possible trains out per hour	200	
Average traffic old terminal, *per day*	60,000	passengers

GRAND CENTRAL TERMINAL, NEW YORK
As seen from a neighboring skyscraper. Hotel Belmont, left. Hotel Commodore, right. Park Avenue in background.

Traffic capacity new terminal, *per hour*	70,000 passengers
Annual traffic old terminal	21,000,000 passengers
Possible annual traffic new terminal	100,000,000 passengers

The new terminal has five levels where the old had but one. There is the gallery or top level on the 42d Street grade; the through train concourse; the suburban train concourse; the suburban track level, and the subway level for handling baggage.

MAIN CONCOURSE AND TICKET OFFICE
Grand Central Terminal, New York

The most prominent interior feature of the station is the main concourse, where all facilities are provided for making travel arrangements, including ticket offices, information bureau, baggage and parcel rooms, telegraph offices, telephone booths, etc. The concourse is 375 feet long, 120 feet wide and 125 feet high to an arched roof, with farther extensions in the gallery at either end. It is a room finished in Botticino marble and buff tinted stone, three immense arched win-

dows on Depew Place and three on Vanderbilt Avenue opposite Forty-third Street forming the ends. The arched ceiling is painted turquoise blue, and presents a view of the section of the heavens as seen from October to March, or from Aquarius to Cancer.

It would be beyond the scope of this history to give anything approaching an adequate description of these great ter-

LOWER LEVEL CONCOURSE
Grand Central Passenger Station, New York

minals. Each is worthy of a separate detailed study. What is set down here must suffice to give the reader an inkling of the extensive and costly terminal stations demanded by the American public and justified by its growing patronage of the railways. The Washington Station is the only one that appears to be in advance of normal traffic, but there are occasions when it seems too small for the capital crowds that surge through its wide-swinging gates.

Kansas City Union Station

It is a far cry from the monumental passenger stations of the New York Central and the Pennsylvania in New York to

the suburbs of Kansas City, where twelve great railway systems have united in a terminal company to construct a station that will accommodate all the passenger business converging there from every point of the compass. It was in the suburbs of the city when it was conceived to obviate the inconveniences of the old stations. It is about two miles southeast of the old Union Station and three blocks away from the

KANSAS CITY UNION STATION
Opened November 1, 1914

Grand Avenue stations. Like all such improvements, it has had the effect of a magnet to attract civic traffic to a new center.

The building of this Union Station was undertaken by the following systems: the Atchison, Topeka & Santa Fe, the Chicago & Alton, the Chicago, Burlington & Quincy, the Chicago, Rock Island & Pacific, the Chicago, Milwaukee & St. Paul, the Missouri, Kansas & Texas, the Missouri Pacific, the St. Louis-San Francisco, the Union Pacific, the Wabash, the Chicago Great Western, and the Kansas City Southern—none of which had been heard of when the Pennsylvania, the New York Central and the Baltimore & Ohio were already the wonders of the Eastern railway world. The list embraced all the roads entering

Kansas City in 1906, when the enterprise was first broached, and the original project included a new belt line around the north end of the city and an entirely new site. That site occupies an area of 18 acres covered by the main building and train sheds—an area exceeeded only by the Pennsylvania and the New York Central stations in New York.

PORTION OF WEST BOTTOM FREIGHT YARDS, KANSAS CITY
Live Stock Exchange in Distance

Although built by a terminal company, this station is of the pull through type—the tracks running straight through under the waiting room. It is constructed in the form of an inverted T, the main body of the station being sideways to the tracks over which the stem extends. The station proper is 510 feet long by 150 feet wide, and rises to a height of 126 feet above the plaza.

On the west of the main buildings are the express buildings extending in a continuous stretch for more than 1,000 feet

The waiting room wing, which extends over the tracks. is 410 feet long and 165 feet wide. On either side of the main

waiting room are passages, called midways, in which are the stairways and elevators leading to the train platforms below. The train shed is 1,370 feet long and covers eight platforms serving 18 tracks, with provision for additional.

The style of architecture is modern French and the exterior is finished in Bedford stone with granite base. The interior style is Louis XVI, with lobby walls of yellow Kasota. The floor is pink Kasota and gray Tennessee, with a black border.

Nothing known to modern conveniences of a passenger station seems to have been omitted in making provision for the comfort of the traveler. The general character of layout and construction can be best understood from the accompanying illustrations.

Passing of Famous Railway Builders

Concurrent with the opening of these modern railway edifices, the transportation world was to lose the services of four leaders who for a generation had carried forward railway development with the courage and energy associated with the work of pioneers. Within fourteen years, 1906-1920, Alexander J. Cassatt, Edward H. Harriman, James J. Hill and Edward Payson Ripley passed into the history of American railways in which for the better part of half a century they had played a most commanding part.

Mr. Cassatt, who died in 1906, did not live to see the completion of the great work which was the crowning demonstration of his exceptional sagacity and capacity as a railway engineer and executive. The double track tunnel under the Hudson and the magnificent terminal in New York and the four tunnels under the East River and the great steel arch bridge over "Hell Gate," connecting with the New Haven System, are the monumental memorials to his genius and foresight. The statue in the Pennsylvania Station fittingly commemorates his services to that company and the transportation industry. It bears the inscription, "Alexander Johnston Cassatt, President, Pennsylvania Railroad Company, 1899-1906, whose foresight, courage and ability achieved the ex-

tension of the Pennsylvania Railroad System in New York City." Mr. Cassatt had entered the service of the Pennsylvania Railroad as a rodman in 1861 and so had spent forty-five years, the better part of his life, with it.

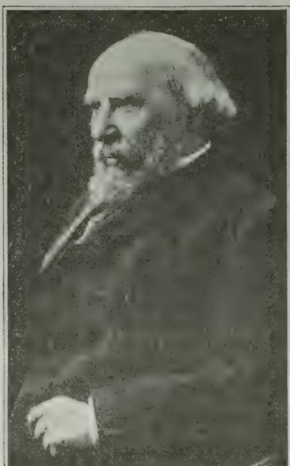
A. J. CASSATT, 1840-1906
Former President of Pennsylvania R. R.

Many would not classify Edward H. Harriman as a distinctively railroad personage at all. And yet at the time of his death, in 1909, he was the foremost and most forceful figure in the transportation world. In a few years of his devotion to the business he had reconstructed the Union Pacific, reorganized and consolidated the Southern Pacific and helped place the Illinois Central in the van of railway progress. His one failure, which has been attended with severe criticism, left the Chicago & Alton an improved and rehabilitated but impoverished common carrier in the territory it serves. Since the Chicago & Alton was reorganized, in 1899, its carrying capacity has increased from 2,244,227 passengers annually to 3,594,991 in 1920 and from 3,251,585 tons of freight to 12,070,934 for the respective years. Wherever Mr. Harriman touched a piece of railway property the result was improved and more profitable service to the public at re-

EDWARD H. HARRIMAN, 1848-1909
Railway Financier & Reorganizer

duced rates, even though, as in the case of the Alton, the road failed to realize net results.

James Jerome Hill survived his more youthful competitor nearly seven years and when he died, in 1916, the whole Northwest, from Lake Michigan to Puget Sound, paid tribute to his energy and sagacity by crowning him "The Empire Builder." The history of the prospecting, financing, construction and management of the Great Northern and the Northern Pacific systems is the story of Mr. Hill's connection with these two transcontinental roads. He also was the foresighted projector of their practical consolidation with the Chicago, Burlington & Quincy. Beyond extending his rails into the vast regions of the West, Mr. Hill was the active promoter of the settlement of those regions with the farmers who were to provide the traffic for his roads, and then he saw to it that the settlers should have the advantage of seed and stock suitable for planting and breeding in their territory. The farmers lost a far-sighted counselor when Mr. Hill passed over the divide.



JAMES J. HILL, 1838-1916
Late President Great Northern Railway

Edward Payson Ripley, who came into the presidency of the Santa Fe when it was reorganized, in 1895, was the last survivor of this "big four" that demonstrated in separate fields the four different types of leaders required in the development of railways to meet the varied requirements on a continent as large as ours. Mr. Ripley was a man of comprehensive views, who at the same time had time and sympathy to spare on the human side of railway man-

agement So he came to be affectionately known from Chicago to San Diego as the "Old Man" of the Santa Fe. He established a sort of paternal relation with the thousands that worked under him and trusted to his judgment and sense of justice for a square deal all along the "Santa Fe," which he knew from end to end.

E. P. RIPLEY, 1845-1920
Late President Atchison, Topeka & Santa Fe Railway

Preceding, contemporaneous with and surviving these leading spirits in the land of railway achievement were and are Chauncey M. Depew and Marvin Hughitt, chairman of the Board of Directors of the New York Central and the Chicago & North Western roads, respectively. Their knees have been under the directors' tables at the same time of these and other leading roads for more than a generation. What Mr. Depew does not know about the legal and financial side of the railway business or Mr. Hughitt does not know of its constructive and operating side is scarcely worth trying to find out. For fully two generations they have watched the railways grow and participated in their development. Their joint reminiscences would make a priceless volume. If Mr. Depew could have found time to write this history, including his experiences with politics and politicians, the boys of America would have been entertained by a story teller and narrator equal to "Mark Twain," and if Mr. Hughitt had written it, it would have been the most authoritative work on practical railway management available to this generation of railway students.

Both Mr. Depew and Mr. Hughitt are natives of New York State, having been born in the first decade of railway development in America described in the second chapter of

this history. Mr. Depew first saw light at Peekskill on the Hudson April 23, 1834. So he has passed his ninetieth birth anniversary as this is written. Three years later Mr. Hughitt was born at Genoa, on August 8, 1837. At that time Peekskill's chief communication with New York was by boat and it was a long walk or ride from Genoa to the Erie Canal long after Mr. Hughitt was a sturdy urchin.

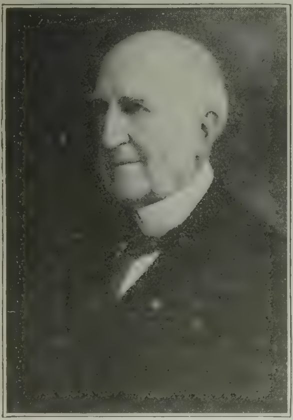
CHAUNCEY M. DEPEW
When President of the New York Central & Hudson River R. R. in 1882.

Although Mr. Depew had the better of Mr. Hughitt in transportation facilities in his early years, the latter was the first to enter railway service, which he did as a telegraph operator in his seventeenth year. That was two years before Mr. Depew graduated from Yale. Mr. Hughitt took Horace Greeley's advice and came west in 1854, while Mr. Depew studied law, was admitted to the bar and in 1866 entered railway service as attorney for the New York & Harlem road, the predecessor of the New York Central on Manhattan Island, with which he has been identified ever since.

It would be a fascinating task to follow step by step the carreer of these two men, so nearly coincident with the progress of American railways from the laying of their first rails. The mere dates given above must suffice, but much of their lives and adventures can be pieced out from the preceding history since 1856. They lived through all the transformation of the period, its struggles, panics and wonderful achievements. Mr. Hughitt has read the first eight chapters of this book and pronounced it worth while. He made a few minor corrections in the history of the early consolidation of the New York Central lines and to one paragraph he penned the remark:

"This is pure fiction, and you are writing history." The paragraph was modified and the reader robbed of an interesting espisode, which not knowing he will not miss.

Two portraits of Mr. Hughitt appear elsewhere in this history.



CHAUNCEY M. DEPEW 1834—
Chairman Board, New York Central Railroad—From his latest photograph.
—*Courtesy of Mr. Depew*

In the Shadow of the Great War

For ten years prior to America's entry into the Great War the railways had been slowly recovering from the effects of the panic of 1907. When the Germans invaded Belgium, after tearing up the "Scrap of Paper" that guaranteed its neutrality, American railways had barely got on their feet after the two lean years 1911 and 1912. In 1913, for the first time in their history, the operating revenues, aided by a 5 per cent rate raise in Central territory, had risen above the *three billion* mark ($3,-125,136,000), only to drop back in 1914 and 1915 as the first effects of the European convulsion and submarine depredations staggered our export trade. During those two years less than 180,000 freight cars and only 4,320 locomotives were built, including the Canadian output—not enough to replace the retirements on account of annual wear and tear.

In 1915 the Commission decided what is known as the Western Rate Advance Case by granting the advances on certain commodities and denying them on others. It was a fifty-fifty decision, where Commissioners Daniels and Harlan, in powerful dissenting opinions, held that "on the record the carriers have in general sustained the burden of proof cast upon them by the statute and are of right entitled to increases

in rates productive of revenue far in excess of what they are accorded by this decision."

There was no opportunity to judge what would have been the effect of this half-loaf decision. Before it became operative we were in the midst of the most active industrial boom that has ever been known in the United States. Where the total domestic exports in 1914 were valued at $2,071,057,744,

TRIPLE ARTICULATED TYPE 1916
Heaviest and Most Powerful Baldwin Locomotive Built to Date

by 1916 they were valued at $5,422,642,505 and by 1917 at $6,169,617,225. In 1920, when these exports reached their peak in value, $8,080,480,821, they were divided, 48.33 per cent natural products and 51.67 per cent manufactures and miscellaneous. In 1919 the crude materials and foodstuffs constituted 54.85 per cent of the value exported.

The share our railways played in this remarkable increase in our export trade is more faithfully represented in the following figures of transportation by quantity, which was not affected by the rise in prices:

Year	Tons Carried (millions)	Carried 1 mile (millions)	Receipts per ton mile (mills)
1915 to June 30........	1,802	276,830	7.32
1916 to June 30........	2,186	342,494	7.14
1916 to Dec. 31........	2,283	365,034	7.15
1917 to Dec. 31........	2,362	394,040	7.15
1918 to Dec. 31........	2,402	408,011	8.49
1919 to Dec. 31........	2,121	375,884	9.73
1920 to Dec. 31........	2,305	411,151	10.52
1921 to Dec. 31........	1,741	307,878	12.75
1922 to Dec. 31........	1,908	341,018	11.85
1923 to Dec. 31........	2,411	414,347	11.25

While this table runs a little ahead of our story and will be referred to later, here it is used to demonstrate the avalanche of traffic that was launched on the railways in 1916 and 1917 and how they rose to cope with it at the lowest average freight receipts per ton mile in their history or the history of any other country.

And right here the student of this great period in the world's history should make note of the fact that while every profiteer in this broad land, whether on farm or in factory or commercial life, was quick to seize upon the world's needs to double and treble his profits, the railways up to the end of 1917 were not permitted to share in the profligacy of war. The succession of low ton mile receipts 1915 to 1917, inclusive, absolves them from having taken advantage of the European cataclysm. This is not saying that they would not have done so, only under the Commerce law they could not.

But during those fateful years everybody took advantage of the railways. Between 1915 and 1917 the compensation of their employes was advanced from $1,272,392,851 to $1,781,027,002, or 40 per cent; individual pay from $825 per year to $1,001, or over 20 per cent. In the meantime the price of the same class of locomotives rose from $23,000 to $47,000; the passenger coach from $8,000 to $9,500 and freight cars from $800 to $1,200, and fuel from $1.13 to $2.07 per ton at the mines.

The Adamson Law

Embedded in the increase of $269,298,076 in the compensation of railway employes between 1916 and 1917 is the story of the surrender of the national administration to the threats of the four railway brotherhoods of a nation-wide strike. This surrender was the prelude to the passage of the so-called "Adamson law," which eventually fastened the basic eight-hour day with time and a half for over time upon the railways. The far-reaching effect of this law upon the economical operation of the railways justifies a brief review of the controversy that resulted in its passage as a party measure.

In February, 1916, the railway trainmen—engineers, firemen, conductors and other trainmen—claiming to number

400,000 men, where only 300,000 were employed, demanded for the freight service an eight-hour day without reduction of the existing wage for a ten-hour day and time and a half for over time. Conferences with the managers began June 1st. After two weeks of ineffectual parleys and after refusing to accept arbitration, the brotherhods ordered a strike vote and on August 8th announced that 90 per cent had voted confirming the authority to strike. The following day the managers invoked the services of the United States Board of Mediation and Conciliation, which suggested arbitration. This the men again refused.

At this point the managers made public their view that the demands would increase the hourly pay 25 per cent and the over-time rate 87½ per cent, and that the aggregate increase, if confined to the freight service alone, would be about $100,000,000 a year, which could not be paid without increasing passenger and freight rates. It was shown that the trainmen constituted only 18 per cent of the employes but received 28 per cent of the total pay roll.

Confronted with what he thought would be a disastrous strike, President Wilson intervened and on August 13th summoned the disputants to a conference in Washington. He proposed as a basis of agreement acceptance of the eight-hour day, a postponement of the over-time demand until its effects could be determined and the appointment of a commission to investigate and report on results. The brotherhoods, with some reservations, accepted the President's suggestions, but the managers balked, declaring that the eight-hour day was not intended to reduce the hours of labor but merely sought to increase wages. They made counter proposals in the nature of a compromise for a commission to determine the effect of an eight-hour day. This was put forward on August 28, but the brotherhoods had already issued a strike order, effective September 4. When the President requested its withdrawal, he was told that the committee which alone could do so had dispersed to their posts to put it into effect. Confronted by an emergency, on August 29th the President appeared before the houses of Congress and in a

fervid message urged the passage of an act that would avert what he regarded as an impending national calamity. He recommended (1) the enlargement of the Interstate Commerce Commission; (2) an eight-hour day for all employes engaged in the operation of trains; (3) the creation of a commission to study the effects on the cost of operation; (4) an expression of approval by Congress if the findings of the Interstate Commerce Commission justified an increase of freight rates; (5) a provision making all railway strikes unlawful until official investigation had been made, and (6) a provision empowering the President to draft railroad employes into service when required by military necessity.

On September 2, after a most perfunctory discussion, Congress passed the Adamson Act, which embodied only items 2 and 3 of the President's suggestions. In the Senate Mr. La Follette was the only Republican to vote for the bill, which Mr. Mann, Republican leader in the House, opposed as an enactment that for the purpose of compensation eight hours shall be a day's labor without any intention of shortening the hours of labor.

An analysis of the act shows that it does not limit the working day of railroad employes engaged in the movement of trains in interstate commerce to eight hours. Instead it provides that their wages shall be based upon a day of eight hours with pro rata over-time pay for whatever time in excess of eight hours they may work. It is a wage statute rather than an eight-hour day law.

The act further provides that the employes should be paid for over time not less than the pro rata for such standard eight hours of work. The punitive time and a half for over time was yet to come.

1—9—1—7

The year 1917 was pregnant with baffling conditions for American railways. It opened with traffic ranging higher than had ever been known before at that season of the year. The revenues for January stood at $311,000,000—an increase

of $43,000,000, or 16 per cent, over the corresponding month in 1916, the previous high record for the month, and a clear $100,000,000 or 47.4 per cent above the operating revenues for January 1910, when a very high level had been registered.

The returns on revenue accurately reflect the volume of traffic during this period because the range of freight receipts per ton mile 1915 to 1917 was practically stationary at 7.22, 7.07 and 7.15 mills.

Beginning with January, railway right of way and rolling stock was taxed to its utmost. There was a continual shortage of freight cars—ranging from 62,247 in January up to 148,627 in May and receding to 33,776 in August, contrary to the seasonal current of shortages.

It is important that the student should take note of the trend of railway shortages at this time in their relation to the entry of the United States into the World War, which dates officially from the Declaration by Congress, signed by the President on April 6, and the taking over of the railways by President Wilson on December 27, 1917. Beginning with April, the car shortages, by months, were as follows:

April	144,797	September	34,605
May	148,627	October	70,380
June	106,649	November	140,000
July	77,682	December	117,132
August	33,776		

Immediately upon the Declaration of War, the railways adopted a national policy to co-operate with the Government in expediting its military operations. A Special Committee on National Defense, with a membership of 28 of the leading railway executives, was organized, which in turn appointed an executive committee of five, known as the Railroads' War Board, which took active charge of the railway war organization, beginning in April, 1917. It consisted of the following members:

Fairfax Harrison, president of the Southern Railway, chairman; Julius Kruttschnitt, chairman of the Executive Committee of the Southern Pacific Company; Samuel Rea, president of the Pennsylvania System; Hale Holden, presi-

dent of the Chicago, Burlington & Quincy Railroad, and Howard Elliott, chairman of the Northern Pacific Railway. In its task of co-ordinating the operation of the railways the War Board was greatly assisted by the cooperation of Interstate Commissioner Edgar E. Clark, who after its organization attended its meetings and brought to its counsels the advantage of close association with the Commission, of which at that time he was chairman.

EDGAR E. CLARK
Ex-Interstate Commerce Commissioner

This Board was confronted at its inception by a shortage of over 140,000 freight cars, resulting principally from a dearth of shipping at the principal ports to handle the products rushed to the coast for export. Instead of being unloaded with normal promptness, loaded freight cars were held for days before being released for further service.

The situation became so serious that on May 29 Congress stepped in and by way of relief conferred stringent powers on the Interstate Commerce Commission whenever the situation called for action, "with or without notice, hearing or the making or filing of a report," to suspend any car service rules then in effect and instead issue whatever directions concerning car service that might seem to be in the public interest. The Commission was also intrusted, after hearing, to establish reasonable rules, regulations and practices in respect to car service.

The Commission and the Railroads' War Board, acting in unison, were able to effect an instant improvement in the car situation, as the reduction in the car shortage from 148,627

in May to 33,776 in August testified. But the free and systematic movement of traffic was retarded and sometimes blocked by the misuse of the priority privilege, not only for war materials but for other descriptions of freight. Priority was all right for certain commodities, but as priority became general it defeated its own purpose.

W. W. ATTERBURY
V.-P. Penn. Ry.

This led to the enactment of what was known as the priority amendment to the Commerce Act. By it provision was made that during the continuance of the war in Europe the president might for purposes of national defense and security direct that certain kinds of traffic shall have preference or priority in transportation whether by rail, water or otherwise. The President could issue such directions through the Commission or any person or persons designated by him. This act also penalized the interference with the orderly movement of trains by physical force, intimidation or threats.

At this time the membership of the Commission was increased to nine and it was authorized to divide itself into divisions with jurisdiction to exercise the powers of the Commission with certain restrictions and requirements.

Out of the lack of preparedness and disorder that attended America's entrance into the war, amid such an industrial and military rush as had never been known, the railways during the second half of 1917 rose to function with most amazing efficiency—amazing because for a whole decade they had been denied the revenues essential to progressive equipment for the increasing demands of transportation. Every element er

tering into their operation—wages, material and money for additions and improvements—cost more, and the last was becoming harder to get with Liberty bond issues marketed by the billion. With the call to arms this Nation became a hive for the recruiting, arming, equipping and transportation of an army that swelled from 190,000 to over a million before the end of the year and was beginning to land in France. The first contingent defying the submarine peril had crossed the Atlantic in July, and by January 1, 176,000 were "over there," the advance guard of the two million American soldiers that were to share the honor of Armistice Day, November 11, 1918; and two million more were training and straining to get across.

W. W. ATTERBURY 1866—
Vice President Pennsylvania R. R. Brig. Gen. U. S. A., in charge construction and operation U. S. Military railways in France 1917-1918

The story of our participation in the World War, of how we made our own port in France with accommodations for scores of ocean steamships at a time; of how we built more than 700 miles of double track, with freight yards greater than the largest on the continent, and set up our own system of telegraph and telephone, and how, in W. W. Atterbury of the Pennsylvania Railroad, America furnished the director of construction and operation of our military railways in France—these and their related facts—constitute the skeleton for another story which is one of the brightest chapters in the history of America's participation in that war "for all we have and are."

The United States expended over $612,000,000 under Director General of Military Railways Samuel M. Felton, President of the Chicago Great Western Ry., upon the rails, rolling stock and railway construction in France as its contribution to saving it from the Hun invasion.

Here it can truthfully be said that in the United States the railways, handicapped by ten years of inadequate rates, with equipment that gaped at the seams, with many of its best men drafted into military service and hobbled with restrictive laws, carried on a traffic that in the nine months between April 1 and December 31 increased over 12 per cent over the same period in 1916, itself a record of performance. For the full year of 1917 the record of the railways compared with the years preceding it was as follows:

	Freight tons carried 1 mile (millions)	Passengers carried 1 mile (millions)
1917 to Dec. 31	394,[illegible]	39,739
1916 to Dec. 31	365,[illegible]	35,007
1916 to June 30	342,494	34,228
1915 to June 30	276,830	32,384
1914 to June 30	288,[illegible]	35,258

The Government Takes Over the Railways

Such was the demonstrated efficiency of American railways at the close of 1917, when President Wilson, misled by the clamor of a coterie of Government ownership agitators, issued his proclamation assuming control of the entire transportation system. Acting on a baseless claim that a great national necessity existed, he based his action on the Act of

HEAVY FREIGHT ENGINE OF [illegible]

Weight loaded: Engine and Tender, [illegible] lbs. Built by American Locomotive Co. for the Virginian Ry. Co.

August 29, 1916, which authorized the President in time of war "through the Secretary of War" to assume control of the transportation system for the transportation of troops, war materials and equipment to the exclusion, as far as may be necessary, of all other traffic.

Obeying the letter of the Act that possession of the railways should be taken over through the Secretary of War, at noon of December 28th Newton D. Baker assumed such control to the end that they should be utilized for the transportation of troops, etc. But at that point the Secretary of War faded from the emergency picture and Mr. William G. McAdoo, Secretary of the Treasury, Chairman of the Federal Reserve Bank System, of the Federal Farm Loan Board and of the United States Section of the International High Commission, was "appointed and designated Director General of Railroads." In this same proclamation, without consulting the owners of the property, it was decreed that they should accept the average of their net operating income for the three-year period ending June 30, 1917, "as a just and reasonable compensation." Whoever suggested the inclusion of the lean year to June 30, 1915, in this test period robbed American railway owners of at least $100,000,000 a year while the guarantee lasted. Had the last year preceding our entrance into the war been chosen, as was done in England, the compensation would have been approximately $1,050,000,000 instead of $940,000,000.

Accompanying his proclamation, President Wilson issued a statement which was intended to reassure the holders of railway securities, as follows:

"Investors in railway securities may rest assured that their rights and interests will be as scrupulously looked after by the Government as they could be by the directors of the several systems."

On January 4, in his message to Congress, President Wilson said:

"The group of railway executives who were charged with the task of actual co-ordination and general direction of the

railways performed their difficult duties with patriotic zeal and marked ability, as was to have been expected, and did, I believe, everything that it was possible for them to do in the circumstances. If I have taken the task out of their hands, it has not been because of any dereliction or failure on their part, but only because there were some things which the Government can do and private management cannot. We shall continue to value most highly the advice and assistance of these gentlemen and I am sure we shall not find them withholding it. * * *

"The common administration will be carried out with as little disturbance of the present operating organizations and personnel of the railways as possible. Nothing will be altered or disturbed which it is not necessary to disturb."

On the last day of 1917 the Railroads' War Board, that had co-ordinated the operations of the railways since April 11 of that year under authority from the principal companies of the country so successfully, finding its occupation gone under Mr. McAdoo's order No. 1, placed its resignation in his hands. It was accepted with alacrity. In its place Mr. McAdoo selected the following Advisory Cabinet:

John Skelton Williams	Comptroller of the Currency
Hale Holden	President, Chicago, Burlington & Quincy R. R.
Henry Walters	Chairman, Atlantic Coast Line R. R.
Edward Chambers	Vice-Pres., Atchison, Topeka & Santa Fe Ry.
Walker D. Hines	Chairman, Atchison, Topeka & Santa Fe Ry.

Mr. Hines occupied the position of assistant to Director General McAdoo. Mr. R. S. Lovett, who had been Director of Priorities under the Railroads' War Board, was appointed head of the Division of Capital Expenditures. But the appointments that boded no good for the railways nor for any economical success of government operation were the designation of W. S. Carter, Grand Chief of the Brotherhood of Railway Firemen, as Director of Labor, with G. W. W. Hanger as his chief assistant.

The appointments of Regional Directors, seven in number, were admirable, and if Mr. McAdoo had possessed the true impulses and intuitions of a great commander and left

the details of management in their hands, under his single-minded administrative co-ordination, the experiment of Government operation of 240,000 miles of railway might have had a very different sequel.

Congress lost little time in putting the stamp of legislative approval on President Wilson's railway policy and promises. By the Act of March 21 it indorsed the basis of compensation and Federal return to be ascertained and certified by the Interstate Commerce Commission; it provided that the property of each carrier should be maintained and "returned to it in substantially as good repair and in substantially as good equipment as it was at the beginning of Federal control."

Under its provisions the President was authorized to initiate rates, fares, charges, classifications, regulations and practices which should not be suspended by the Commission pending their final determination, thus abrogating for the time being a process that had made the advancing of rates subject to suspension and interminable delay even where ultimately validated.

The final sections of this Act are enlightening:

"Sec. 15. That nothing in this Act shall be construed to amend, repeal, impair or affect the existing laws or powers of the states in relation to taxation or the lawful police regulations of the several states, except wherein such laws, powers or regulations may affect the transportation of troops, war materials or Government supplies, or the issues of stocks or bonds.

"Sec. 16. That this Act is expressly declared to be emergency legislation, enacted to meet conditions growing out of war; and nothing herein is to be construed as expressing or prejudicing the future policy of the Federal Government concerning the ownership, control or regulation of carriers or the methods or basis of the capitalization thereof."

Once charged with irresponsible authority over American railways, Mr. McAdoo lost no time in proceeding to exercise it. No infant finding himself in possession of a new toy ever set to work to tear it to pieces to see the wheels go 'round with more gleeful alacrity than did the Director General of Railroads when they were placed in his hands. With the Railroads' War Board out of the way, orders flew from and reports poured into Washington in a bewildering cloud that no man could number. Computing machines were needed to

count them. Something like 400 of the most capable men in railway service were discharged to make room for their hand-picked successors owing their advancement to Mr. McAdoo. Every scrap of paper upon which there was space to print it bore the official imprint:

United States Railroad Administration

(W. G. McAdoo, Director General)

The two million railway employes were thus officially notified that they must know no other god but ME.

The real test and proof of the bureaucracy headed by Mr. McAdoo came in his two orders Nos. 27 and 28, issued May 26th and 27th, respectively. The necessity, misnamed emergency, behind these two orders can be best explained by the following statement of the earnings and expenses of Class 1 roads for the first six months of Federal control:

1918	Revenues	Expenses	Ratio 1918	Ratio 1917
January	$ 285,083,748	$ 270,756,750	94.97	71.63
February	289,683,833	260,590,900	89.96	78.31
March	365,912,476	283,428,186	77.46	72.21
April	370,614,729	280,655,455	75.73	71.28
May	378,242,104	285,523,303	75.49	69.00
June	393,309,379	435,096,305	110.62	67.37
(*a*) Total 6 mos......	2,081,448,000	1,815,706,527	87.23	71.34

(*a*) The footings are from the official final summary for June and differ slightly from the footings of the monthly returns.

To the trained railway manager or financier the one thing called for by the condition revealed in these official figures was an advance in rates sufficient to take care of the expenses as they existed, already running wild. But Mr. McAdoo thought otherwise. In January he had appointed a Railroad Wage Commission to investigate and report on the question of wages and hours of service of railroad employes; but when the time came to act he "felt obliged to depart from its recommendations in some particulars." He departed about $300,-000,000 worth. In what "particulars" General Order No. 27 does not vouchsafe. Beginning with employes earning $46 or under per month, the order added 43 per cent, or $20, to the monthly pay and from that point up to those receiving

$250 the per cent was on a descending scale until it yielded $1 for the man receiving $249. There were many exceptions and variations from this method of raising wages, but its ultimate effect, with changes in working conditions, was to raise the average pay of all employes from $1,001 in 1917 to $1,480 in 1919. As the pay roll had in the meantime been increased by 180,546 employes, the total compensation rose from $1,739,482,142 to $2,843,128,432, or over a billion dollars, with 18 billion less tons of freight carried one mile. Compared with 1916, before the Adamson law went into effect, the total compensation of railway employes showed an increase of over 90 per cent.

How Mr. McAdoo or his successor, Mr. Walker D. Hines, ever expected to catch up with such an unprecedented advance in wages, accompanied with an equal or greater advance in the price of coal, materials and supplies, with an advance of 33 per cent in freight rates and 25 per cent in passenger fares, as they finally worked out, passes understanding. True, the Railroad Wage Commission had estimated the cost of its recommendations at "not less than $300,000,000 in the year 1918," never anticipating an addition of nearly 200,000 five-dollar a day emergency workers to the railway ranks.

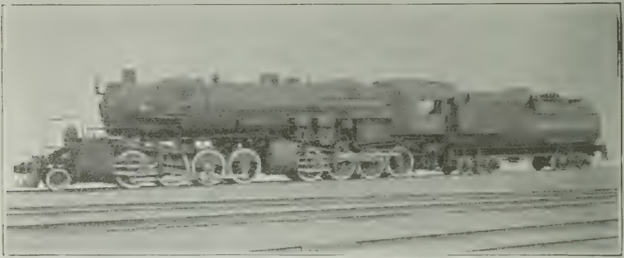
As if the inadequacy of the raise in rates to meet the advance in wages was not enough to stagger the revolving fund of $500,000,000 provided in the Act of March 21, the wage rate was made retroactive to January 1, 1918, whereas the advance in rates and fares could be and were only made effective on June 25 and 10, respectively.

These momentous changes were fully reflected in the significant items of the income account for 1918, Class 1 roads under Federal control, as follows:

Revenue from operation........	$4,850,991,008
Operating expenses	3,948,192,102
Taxes	183,177,868
Rent of equipment and facilities	35,903,074
Net operating income......	683,717,964
Compensation paid railways....	893,310,130
Government loss	209,592,166

For all railways taken over the Government loss was over $212,000,000.

Before 1919 was half spent the two revolving funds—$750,000,000 had been added to the original $500,000,000—had dissolved, vanished into thin air, leaving nothing but a vacuum in which to revolve. Where Mr. McAdoo's Commission had estimated that the raise in wages would increase



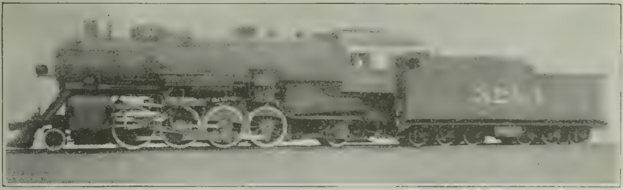
HEAVY BALDWIN ARTICULATED MALLET LOCOMOTIVE
Built for the Baltimore & Ohio R. R. in 1919

the railway pay roll to $2,205,432,938, the actual figures were $2,606,284,245. But it did not stop there. Under the fostering care of Mr. Carter, Director of Labor, it rose to $2,828,014,440 in 1919 and to $3,681,801,193 in 1920, when the Railroad Labor Board lent a boosting hand.

But if Mr. McAdoo was open-handed in spending revolving funds on labor, he proved niggard when he faced the equipment situation. Confronted by a shortage of 135,000 freight cars in March, 1918, he ordered 1,415 locomotives and 100,000 freight cars, standardized, when the immediate need was 10,000 locomotives and 250,000 freight cars adapted to meet the varying conditions of climate, terrain and traffic requirements of 240,000 miles of line. Subsequently he increased his order of locomotives by 600, but that order of freight cars stood throughout Federal control, whereas at least 100,000 cars are destroyed or incapacitated every year.

This failure to recognize the sound rule of railway management that demands more installments than retirements,

in which obsolescent cars must be included, left the railways to cope with the unprecedented traffic of 1920 confronted by a car and motive power shortage that lasted from January until the business depression set in, in December. The promise of the President and the authorizing Act of maintenance and good order return were ignored for the twenty-six months of Federal control.



BALDWIN MIKADO TYPE OF 1920
Built for Atchison, Topeka & Santa Fe Ry.

On December 31, 1918, Mr. McAdoo deserted the labor-logged ship, handing over the administration to his assistant, Walker D. Hines, who, like his predecessor, was a lawyer and not an experienced operating railway official. What Mr. Hines might have achieved had the original crushing responsibility fallen on him cannot be guessed. The whole train was running down hill at an accelerating pace when he entered the cab and he had no sand to put on the track. Mr. Hines went on the principle that there is a bottom to every hill and that for every down grade there must be an up grade. One of his first orders (January 6, 1919) was an interpretation of General Order No. 27 that it should apply to all railway employes "earning less than $250 per month in December, 1915," and "Where such persons have not been granted the increases provided for in General Order No. 27 such increases will be made applicable retroactive to January 1, 1918, and until suspended by supplement thereto."

Confronted with the alternative of meeting deficits with an increase of rates or a reduction of wages, he did neither. He granted increases of wages and entered into agreements

that raised them still higher. He postponed the advance in rates the situation demanded with sanguine prognostications that improved business would insure sufficient earnings. With strange inconsistency he prophesied a traffic that would tax facilities and refused to add a locomotive or a freight car to the inadequate orders issued by Mr. McAdoo.

The record of locomotives and cars actually built in the three years 1919, 1920 and 1921 stands as an indictment of the Federal administration as executor of its trust:

Year	Locomotives	Passenger cars	Freight cars
1919	2,162	466	101,372
1920	2,022	1,272	60,955
1921	1,185	1,636	48,696

The provision of power and carrying capacity fell at least 4,000 locomotives and 300,000 freight cars short of what prudent management required. Moreover, the locomotives and cars actually built, especially the former, were largely on orders given previously by the railway corporations themselves.

Second Year of Federal Control

The financial returns for the second year of Government control were more disappointing than the first, as the following statement of Class 1 roads under Federal control shows:

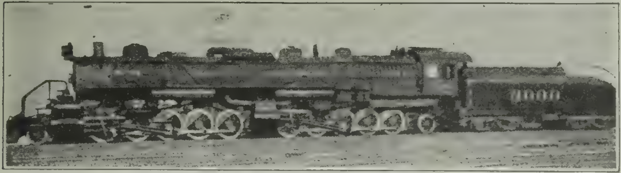
Revenues from operation	$5,124,595,207
Expenses of operation	4,360,136,355
Taxes	195,763,096
Rent of equipment and facilities	33,179,485
Net operating income	535,516,371
Compensation paid the railways	911,495,342
Government loss on operation, 1919	375,978,971
Government loss on operation, 1918	209,592,166
Government loss on operation, two years	585,571,137

This covered only Class 1 roads, where the total for all roads taken over, some 240,000 miles, called for a yearly compensation of about $940,000,000. The loss to the Government on operation alone for the two years was therefore in the neighborhood of $650,000,000.

To this must be added the $381,000,000 paid by the Government for its inadequate replacement orders of locomotives and freight cars in 1918 and 1919 and $763,000,000 for "addi-

tions and betterments," all finally added to railway capitalization with little tangible to show for it.

That was the situation at the close of 1919, when the war had been over more than a year, and the Federal Railway Administration has never given any comprehensive account of its stewardship, the figures given above having been extracted from the annual and monthly statistics of the Interstate Commerce Commission.



A 400-TON SANTA FE LOCOMOTIVE

As the time for relinquishment of the railroads under the Act of March 21, 1918, approached, it became a matter of grave concern how it could be accomplished without involving serious consequences to the commerce and industry of the country as well as the railways. The Act provided that Federal control should not continue beyond "one year and nine months next following the date of the proclamation by the President of the exchange of ratifications of the treaty of peace."

The war ended on November 11, 1918, the date of the armistice; but the treaty between the Allied Powers and Germany was not signed until June 28, 1919. On December 24 President Wilson issued a proclamation turning back the railroads to private control on March 1, 1920. January 1 had been originally fixed, but owing to the necessity for legislative action the latter date was chosen. The Esch-Cummins or Transportation Act of February 28, 1920, was the legislation referred to. This extended the Government guarantee to the amount of the Federal return for six months after the owners resumed control—that is, until September 1, 1920, *when everything in the nature of a guarantee ended.*

The Transportation Act of 1920

The Esch-Cummins Act, officially known as the "Transportation Act of 1920," went far beyond safeguarding public and railway interests during the so-called transition period. Under "Title II, Termination of Federal Control," the general provisions of the Act of March 21, 1918, were made applicable to what was termed the "guaranty period," to wit: the "six months beginning March 1, 1920." The railways were to be operated by their owners during that period—the difference between their net operating income or deficit and the Federal return fixed by the "test period" to be paid by or to the Government, as finally adjusted by the Commission. This guarantee was conditional on its acceptance by the individual carriers on or before March 15th. Acceptance was general, the Southern Railway being the chief exception, preferring to take its profit or loss on operation to compensation on a basis it deemed inadequate. Financially the Southern lost out on this show of independence, for it suffered in common with all the railways from the deluge of expenses that broke all records in the year 1920. But it had its compensations in freedom in adjustments. This year proved the culmination of wage advances and expensive working conditions that ran wild under the politico-economic theories in the saddle of Federal control. Although the railways were operated under the terms of the Act of February 28, 1920, for the greater part of that year, they inherited the conditions prevailing throughout 1918 and 1919, when the National treasury was drawn upon to make good the results of wasteful mismanagement. The following condensed income account tells the story:

	Class I Roads 1920
Operating revenues	$6,234,264,201
Operating expenses	5,886,573,383
Taxes	274,808,339
Rent of equipment and facilities	60,247,341
Net operating income	12,635,138
Eight months guarantee	613,000,000
Government loss	601,635,138

But for the presence of some fifty to sixty million back mail pay in the revenues of 1920, there would have been a

deficit instead of a net operating income of $12,635,138. The total loss of the Government on its thirty-two months' guarantee was approximately as follows:

1918	$ 209,592,166
1919	585,571,137
1920 (8 months to Sept. 1)	601,635,138
Total 32 months.......	1,396,798,441

As these figures cover only Class 1 roads, the total loss to the Government on all roads taken over was considerably greater. A proposal to extend the trial of Federal control for an additional five years, which was strongly urged by Director General McAdoo and his successor, Mr. Hines, met with little popular support, and so, on September 1, 1920, the railways went back into full regulated private operation.

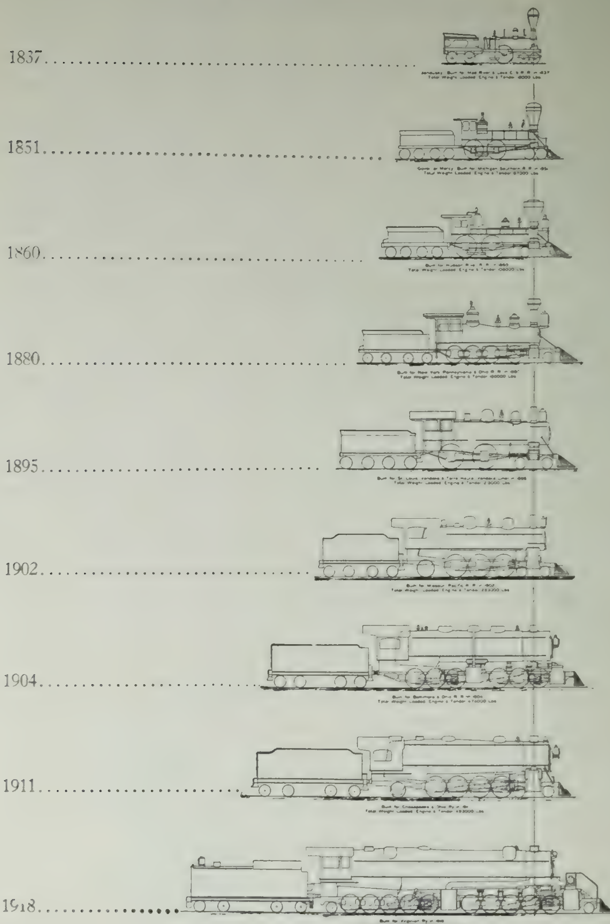
In a recent address before the Carnegie Institute of Technology, Arthur T. Hadley, President Emeritus of Yale University and one of the few lay authorities on transportation subjects, discussing Federal control, said: "For a time Mr. McAdoo and those about him thought that he could prove the possibility of solving the railroad problem by taking the decisive powers of the management out of the hands of the owners. * * * The verdict was against him. During nearly two years which elapsed after the close of the war no attempt was made to balance the railroad budget. Of the three ways of doing this—to increase rates, to reduce wages, or to get the same amount of work done by the smaller number of men—the Government lacked the courage to choose any. The result was an appalling deficit."

Decreased Mileage

During the concluding years of this decade the country witnessed the unusual phenomenon of an actual decrease in the mileage of American railways. Between 1916 and 1920 the miles of line owned, as reported by the Commission, were as follows:

1916 to June 30........	254,250 miles
1917 to Dec. 31........	253,626 miles
1918 to Dec. 31........	253,528 miles
1919 to Dec. 31........	253,152 miles
1920 to Dec. 31........	252,844 miles

Growth of Steam Locomotive 1837-1918

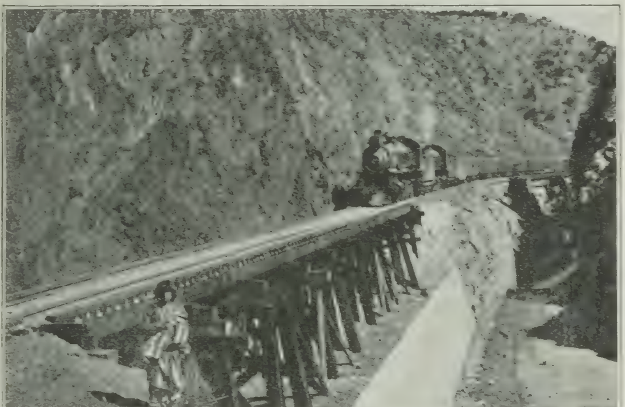


Happily, the decline in single track was accompanied by an increase of 3,030 miles of auxiliary track and 9,686 miles of yard track and sidings.

The remarkable exhibit on page 378 was drawn to scale for this work by the American Locomotive Company. The counterpart of each of these nine locomotives, separately illustrated, will be found in the text of the decade to which it belongs. Thus assembled, these locomotives give a convincing picture of the process by which American railways have risen to their powerful position in the transportation world. It is expressed in the contrast between the 18,000 lb. giant of 1837 and 898,000 lb. giant of 1918. A corresponding growth in inhabitants would have given the United States a population of over 850,000,000!

As for the "Sandusky," which tops this impressive pyramid of locomotive progress, President Fletcher of the American Locomotive Company believes that it was never photographed but furnishes the spirited drawing, which is reproduced in its appropriate place.

Past, Present and ?



THE ABORIGINE MAKES WAY FOR THE LOCOMOTION
—Scene in Apache Canon, N. M.

CHAPTER XI

OPENING OF THE TENTH DECADE—1920

Aftermath of Federal Control. Passage of the Transportation Act, 1920. Railroad Labor Board Makes Immediate Advance in Wages and the Commission Advances Rates.

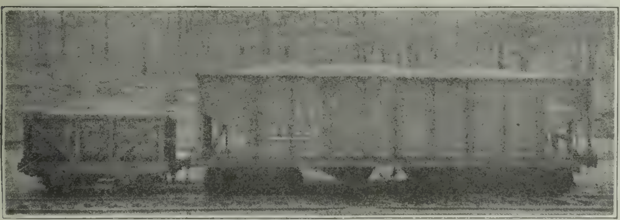
WITH the return of the railways to private control disposed of in Title II of the Transportation Act, 1920, the statute proceeded to make radical changes in the regulation of American railways. The first of these, Title III, was aimed at the prevention of any interruption of the operation of any carrier growing out of any dispute between it and its employes. Such disputes, if possible, were to be decided in conference between the representatives of the carriers and their employes "directly interested in the dispute". In case such conference failed to decide the dispute, provision was made for its reference to boards of labor adjustment and finally to the Railroad Labor Board established under the Act.

MAIN HALL CHICAGO UNION STATION, OCTOBER, 1924

This Board, which was the new departure under the Act, was to be composed of nine members—(1) three, to be known as the Labor group, to be appointed by the President, subject to confirmation by the Senate, from not less than six nominees made by the employes as prescribed by the Commission; (2) three, to be known as the Management group, to be appointed in the same way from not less than six nomi-

nees named by the carriers as prescribed by the Commission, and (3) three, to be known as the Public group, to be appointed by the President subject to confirmation by the Senate.

The Act specifically provided that any member of the Board who during his term of office is an active member or holds office in any organization of employes or any carrier



COAL CARS—PAST AND PRESENT
Philadelphia & Reading R. R.

or owns any stock or bonds thereof, shall become ineligible for further membership upon the Board. This provision was a dead letter from the start, so far as several Labor members of the Board were concerned.

In addition to jurisdiction over disputes coming to it through the indicated channels, the Board was authorized upon its own motion to receive and hear and with due diligence decide any dispute involving wages or salaries or grievances or rules and working conditions likely substantially to interrupt commerce. Decisions of the Board require the concurrence of at least five members, of whom, in certain cases at least, one shall be a member of the Public group.

In determining the justness and reasonableness of wages in any dispute the Board, so far as applicable, shall take into consideration, among other relevant circumstances, the following:

(1) The scale of wages paid for similar kinds of work in other industries;

(2) The relation between wages and the cost of living;

(3) The hazards of the employment;
(4) The training and skill required;
(5) The degree of responsibility;
(6) The character and regularity of the employment; and
(7) Inequalities of increases in wages or of treatment, the result of previous wage orders or adjustments.

The Board was given no authority to enforce its decisions

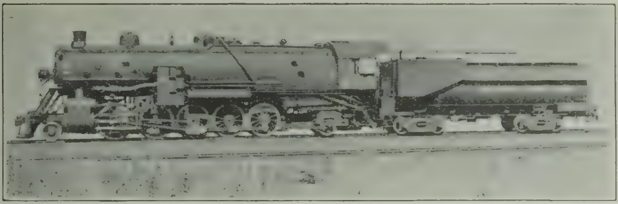
200-TON ELECTRIC LOCOMOTIVE of 1924
Length Inside Knuckles 68 ft. 2½ in.

farther than through their publication and the force of public opinion, in which respect the Act followed the principle so successfully invoked in the original state regulation in Massachusetts. Decisions were effective only as the facts and reasoning behind them appealed to the public as convincing and just.

Amendment to the Interstate Commerce Act

Title IV of the Transportation Act, 1920, consisted of numerous amendments to the Commerce Act, the most important of which was known as "Section 15a," which formulated rules for rate making. Under it the Commission was empowered to prescribe just and reasonable rates, so that the carriers as a whole or in groups would, "under honest, efficient and economical management," earn a net annual railway operating income equal to a fair return on the aggregate value of the carriers' property held for and used in the service of transportation. Net operating income was defined to include debits and credits arising from equipment and joint facility rents. The fair return was fixed at 5½ per cent on the aggre-

gate value for two years, beginning March 1, 1920, with an additional ½ of 1 per cent for improvements, betterments and equipment. Any excess over 6 per cent on the value of its property received by any carrier had to be divided in two—one-half going into a reserve fund of the carrier and the other half to be paid to the Commission to be kept in a re-



BALDWIN OIL BURNING HEAVY FREIGHT
Southern Pacific Ry., 1922

serve revolving fund for purposes described in the Act. The ostensible purpose was to assist by loans weak companies. It came to be known as the "recapture" clause of the Act, because it was aimed to recover whatever surplus of net income resulted from the rates being unnecessarily high for the prosperous companies.

The real crux of the problem imposed on the Commission was the determination of the aggregate value of the carriers' transportation property. For this purpose it was authorized to utilize the results of the Valuation Act of 1913, so far as deemed available, and was directed to give due consideration to all elements of value recognized by law for rate-making purposes, including the property investment accounts of the carriers only to the extent that they were entitled to consideration in such an inquiry.

Consolidation of Railways

By an amendment to Section 5 of the Commerce Act the Commission was directed to prepare a plan for the consolidation of the railway properties into a limited number of systems. Under this existing routes and channels of trade were to be maintained and competition was to be preserved as far

as possible. When the Commission had prepared its tentative plan, it was to publish the same and hold public hearings upon it.

Under this section a tentative plan has been submitted and hearings have been held. But to date little progress has been made toward actual consolidation, for the simple reason that only weak companies favor it as a means to their improved financial condition and strong companies do not see any advantage in diluting earning capacity with unproductive mileage. Happily the Act permits of the voluntary consolidation of railway properties, with the approval of the Commission. Along this line several consolidations have taken place and more are proposed.

Now let us review the progress of events under the more important provisions of the Transportation Act, 1920, which went into effect February 28, 1920.

The $700,000,000 Labor Award

The first reaction of far-reaching consequences, to the Transportation Act, 1920, was the decision of the Railroad Labor Board which advanced the wages of all classes of railway employes by various percentages that aggregated between $600,000,000 and $700,000,000 a year. The first figure was the estimate that accompanied the decision, the latter is included in a total increase of the pay roll from $2,828,014,440 in 1919 to $3,681,801,193 in 1920, or $853,786,753. Part of this increase was due to the enlargement of the staff by approximately 112,000 men. The real advance was in average yearly pay from $1,482 in 1919 to

CONDUCTOR LEWIS W. RAGAN ON BLOCK SIGNAL TOWER NAMED AFTER HIM

The Tower is at Delaware, 3 miles South of Wilmington. Mr. Ragan has been in Service 50 years

$1,820, or 22.8 per cent. Compared with the average pay in 1913, before the breaking out of the World War, the average of $1,820 marked an increase of over 138 per cent in wages in seven years.

This enormous addition to the already heavy burden imposed on American transportation was decreed by the Labor Board before it was fairly warm in its newly created seat of

HELL GATE CUT-OFF, LONG ISLAND
This cut-off enables the Pennsylvania road after passing under Manhattan to Long Island to regain the main land by the bridge at the right separately illustrated
—Copyright Major Hamilton Maxwell.

authority. The Board was confirmed by the Senate on April 15, 1920, and was immediately confronted by the controversy over requests for wage advances, aggregating some $800,000,000, that had been pending since January, 1919, involving, as the Board admitted, as "serious, difficult and intricate problems as had ever been presented to tribunals in this country." It listened to arguments by the day, read testimony by the ream and studied thousands of exhibits and statements and after giving consideration to all the condi-

tions enumerated by the Act and also "other relevant circumstances," on July 20th it delivered its decision which estimated "that the increase in wages herein provided for will impose on the railroads an addition to the pay roll of March 1st, 1920, aggregating approximately six hundred million dollars per annum." For reasons stated in the opinion satisfactory to itself and to the employes, the advance was

FOUR TRACK 977½ ft. HELL GATE ARCH CROSSING THE EAST RIVER, NEW YORK

made retroactive to May 1, 1920. It declined to state how the Board divided on the various questions involved. The effect of the retroactive clause was shown in the returns for July and August, 1920, when the operating ratio ran up to 98.40 per cent and 124.23 per cent, respectively, exclusive of taxes and equipment and facility rents.

One of the relevant circumstances apparently overlooked at the time of its momentous first decision was the paragraph in the Act which provided that "The Labor Board may upon its own motion within ten days after the decision in accordance with the provisions of section 3 of any dispute with respect to wages or salares of employes or subordinate officials or carriers, suspend the operation of such decision if the Labor Board is of opinion that the decision involves such an increase in wages or salaries as will be likely to necessitate a substantial readjustment of the rates of any carrier."

For lack of time, the Board postponed decision of questions involving rates and working conditions.

Valuation and Rates Under the Act

Immediately upon the passage of the Transportation Act, 1920, the Commission entered upon its duties relative to the adjustment of rates to yield a just and reasonable return on

ELECTRIC LOCOMOTIVE, TRAIN AND BLOCK SIGNALS ON NEW YORK CENTRAL AT RIVERDALE 1921

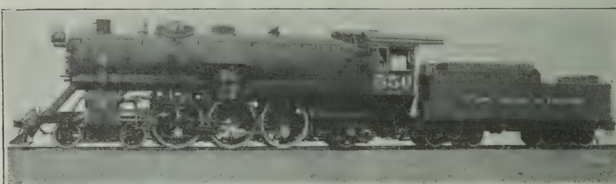
the valuation to be fixed by it. It first assigned March 22 for hearing the question whether the rate adjustment should be for the carriers as a whole or by rate groups or territories. It was decided to make the adjustment by groups, as follows: Eastern, Southern, Western and Mountain-Pacific. For general purposes the last named was to be included in the Western group. It first found that the book cost of road and equipment of all classes of carriers reporting to it on December 31, 1919, was as follows:

Eastern group	$ 9,038,194,615
Southern group	2,183,923,124
Western group	8,818,454,872
Total all groups	$20,040,572,611

Applying itself to the task of determining the aggregate value of all railway property, as defined by the Act, "held and used in the service of transportation;" and utilizing the

results of its investigations under the valuation sections of the Commerce Act, as far as available, and giving due consideration to all elements of value recognized by law for rate-making purposes, the Commission made the following approximation for the three groups:

Eastern group, as defined by the carriers..	$ 8,800,000,000
Southern group, as defined by the carriers.	2,000,000,000
Western group, as defined by the carriers, including both Western and Mountain-Pacific groups	8,100,000,000
Total all groups	$18,900,000,000



BALDWIN PACIFIC TYPE EXPRESS PASSENGER—1922

Thereupon the Commission named the following increases for the respective groups: Eastern group, 40 per cent; Southern group, 25 per cent; Western group, 35 per cent, and Mountain-Pacific group, 25 per cent. These percentages were arrived at after a searching analysis of the traffic and needs of the carriers in the respective territories.

In general terms, the carriers were authorized to increase passenger fares 20 per cent; excess baggage rates, 20 per cent; milk and cream on passenger trains, 20 per cent, and a surcharge of 50 per cent on Pullman fares was granted. The last was in reality an increased passenger fare for extra and superior facilities, the proceeds going to the railways, the Pullman Company merely acting as a collector of the charge. The rates were made effective upon not less than five days' notice to the Commission, or at least three months after the increased wages became effective.

These increases as authorized were intended to yield the full 6 per cent ($5\frac{1}{2}+\frac{1}{2}$), as contemplated by the Act "to make

provision in whole or in part for improvements, betterments or equipments, which, according to the accounting system prescribed by the Commission, are chargeable to capital account," as the record left "no doubt as to the needs of the country for additional transportation facilities."

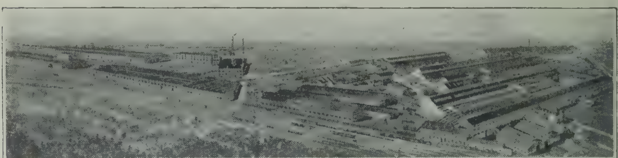
The decision of the Commission bears date July 29 and takes note of the fact that "On July 20, 1920, (only nine days before) after the close of the hearings and oral argument, the Labor Board announced a decision "awarding approximately $618,000,000 as increased wages."

SCHENECTADY PLANT OF AMERICAN LOCOMOTIVE CO.

This, as the sequel demonstrated, sufficed not only to vitiate all the Commission's studied anticipations of a 6 per cent net return on the $18,900,000,000 valuation, but actually left the railways in 1920 earning the largest operating revenues on record with an operating deficit. The Commission, with full information, had done its part, whereas the Labor Board, ill-balanced in organization and overwhelmed with the complexity of conditions affecting the cost of living of approximately two million men, did not stop to inquire whether the $618,000,000 would "necessitate a substantial readjustment of the rates of any carrier."

And so the mischief was done. The effect of the Labor Board's prodigality was seen in the failure of the railway revenues to meet the expectation of the Transportation Act, 1920, in 1920 by $1,021,772,792; in 1921 by $423,687,940; in 1922 by $262,619,407 and 1923, when the Commission had

raised the rate of return on valuation to 5¾ per cent, by $109,092,632. And so in four years the net operating income of the railways fell more than a billion and three-quarters below the just and reasonable expectations of its authors and the administration of the Commission. If to the valuation of July, 1920, be added the betterments since made on capital account under the direction of the Act for supplemental valuation "from time to time and as often as necessary," the failure to yield a reasonable return would be much greater for the



BROOKS PLANT, AMERICAN LOCOMOTIVE COMPANY

new investment, since 1920 to December 31, 1923, has been approximately two and a half billion dollars, without including the $1,144,000,000 securities the railways have had to issue to take care of improvements and betterments under Federal control.

New York City in 1831 and 1924

In taking account of the different conditions facing the transportation industry between the first railway decade on this continent and now, perhaps the transformation that has taken place in the surroundings of Trinity Church, New York, in the interim, as shown in the two following pictures, may help the reader to visualize them. New York City, where rail and water ways meet more profitably to the immediate community than elsewhere in the Union, had to be pictured in a slow process by pen or pencil in 1831, whereas its tallest skyscraper is caught by an instantaneous camera from the air in 1924.

Such was New York only three years before Chauncey M. Depew opened his eyes on the gentle scene at Peekskill depicted in an earlier chapter. Today in order to identify

BROADWAY, NEW YORK CITY, IN 1831
Note Trinity Church at left

the steeple of Old Trinity that rises above this semi-sylvan scene of ninety odd years ago, he would have to ascend in an airplane and look up through the Wall Street Cañon to catch a glimpse of its needlelike spire at the top center of the accompanying picture.

WALL STREET
The Ganglion of New York in 1924—From the air
—*Wide World Photos.*

The Recession of 1921

In 1921 the railways of America, in common with all other national industries, suffered from the reaction following the abnormal activities and excessive production of 1920. Where the entire community had reveled in high costs of everything entering into the daily life of the people, the railways found themselves on the brink of bankruptcy from their inability to adjust their expenses to their revenues. Between July, 1920, and September, 1921, the "farm price" of grain dropped more than 50 per cent and the Commission was appealed to for a reduction in the rates which had been advanced by Director General McAdoo in 1918 and by the Commission, effective August 26, 1920. The Commission found that these advances had raised the freight rate on various kinds of grain from 50 to 80 per cent. It also found that during the twelve months after the advance of 1920 the carriers had not earned "an aggregate net railway operating income over or about one-half of 5½ per cent of the value of their property as tentatively fixed by us."

This cut the return to the owners of the roads in one-half of the "just and reasonable" return on their property as fixed by the Commission, whereas the slump in the price of wheat only cut the war peak price in two. In September, 1921, the farmers were still getting 29 per cent more for their grain than they did in 1913 and almost exactly the same as they received in 1915; whereas the net railway operating income in 1921 was $200,000,000, or 24 per cent. below the figure for 1913. Acting in what it regarded as the governing good to the whole people, the Commission cut the advance in wheat and hay granted in July, 1920, in half and reduced the rates on coarse grains to the extent that they exceeded 10 per cent less than those prescribed on wheat.

In the spring of 1921 the carriers applied to the Railroad Labor Board to settle disputes over working conditions and to reduce wages in line with the decreased cost of living since its order advancing wages some $600,000,000 in July, 1920. On June 1st the Board rendered its decision, effective

July 1, 1921, reducing wages by an average of about 12 per cent of the 1920 scale for the classes to which it applied. The decreases were by specific amounts per hour for different classes. In actual effect this decision reduced the pay roll by about $275,000,000 to $300,000,000, or less than one-half the advance of July 1, 1920. Actually it amounted to only one-third of that advance plus the changes in working conditions. The great economy in operation in 1921 was to come in the reduction in the number of employes from an average of 2,022,832 in 1920 to 1,667,580—a decrease of 355,252 persons, a majority of whom were unnecessary, as the pay roll for 1923 was to demonstrate, when an average of 1,857,713 employes moved the greatest traffic ever carried by American railways.

The full effect of these decisions of the Commission and the Labor Board was not apparent until 1922, when the dissent of the shop crafts to any reduction in wages was to precipitate the disastrous strike of that year. A strike of the train service organizations was called for October 30, 1921, but three days before that date was called off. The operating results for the year 1921 in comparison with those for Class 1 roads in 1920 were as follows:

	1921 (thousands)	1920 (thousands)
Revenues	$5,568,505	$6,234,265
Expenses	4,602,116	5,886,573
Taxes	279,725	274,809
Equipment and facility rents	68,969	53,835
Uncollectible revenues	1,883	1,320
Net operating revenues	615,812	17,727
Employes, average number	1,667	2,022
Compensation	$2,800,897	$3,681,801
Average per year	1,680	1,820
Operating ratio	82.68%	94.29%
Pay roll ratio	50.30%	59.06%

The last two lines of this statement indicate how the railways were struggling back toward normal after the wasteful experience of Federal control. The ratios for 1921 were still far above the level of economic safety, which, for expenses sans taxes, experience had placed below 70 per cent, while before the war the ratio of compensation of employes to revenues ranged from 38.40 per cent to 44.05 per cent.

During 1921 there was a continuous surplus of freight cars, running as high as 495,781 in April, from which it receded to 121,944 in October, only to jump back to 493,357 in January, 1922, when the tide turned.

The Chicago Union Station

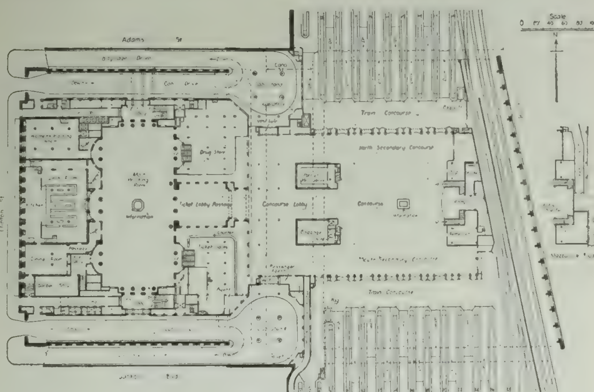
Plans for the erection of the great union station on the west side of the south branch of the Chicago river were

ARCHITECT'S DRAWING FOR CHICAGO UNION STATION
This shows the relation of the station to the river, surrounding territory and the tracks entering from the North and South. It can be compared with the completed structure.

well under way before the World War brought all such enterprises to a stop. Money and labor were not available for such triumphs of peace when the Government was floating bonds by the billion and calling for men for the front and for war industries by the million. But the property along the river for five blocks from Washington Street to Van Buren and two blocks west on the river between Adams Street and Jackson Boulevard was in hand, ready for the monster yard and station. The accompanying layout shows what was proposed. It was designed to accommodate the trains of the Chicago, Milwaukee & St. Paul and the Pan Handle division of the Pennsylvania coming in from the north

and west; and the Chicago, Burlington & Quincy, the Chicago & Alton, and the main lines of the Pennsylvania coming in from the south, east and west at the south end. There were to be eighteen tracks occupying the entire space between the river and Canal Street, which had to be excavated to give head room for the concourse which covered them.

The tracks entering from the north are protected by steel umbrella train sheds extending from Adams street two blocks



GROUND PLAN CHICAGO UNION STATION

to Madison, while those coming in from the south are similarly covered by sheds extending from Jackson Boulevard two blocks to Congress. The extreme ends of these sheds are more than a quarter of a mile apart. The main concourse separates their stub ends.

Outside of these train sheds, and between them and the river, lie three tracks affording communication between the two sections of the terminal. Provision is also made for separate entrances for suburban passenger trains from the Jackson Boulevard and Adams Street sides of the station.

As this history goes to press plans are in preparation for adding fifteen stories to the main building shown in the

preceding pages, making twenty-three in all. This in itself testifies to the unending demands made upon the railways for increased accommodations to handle the Nation's business.

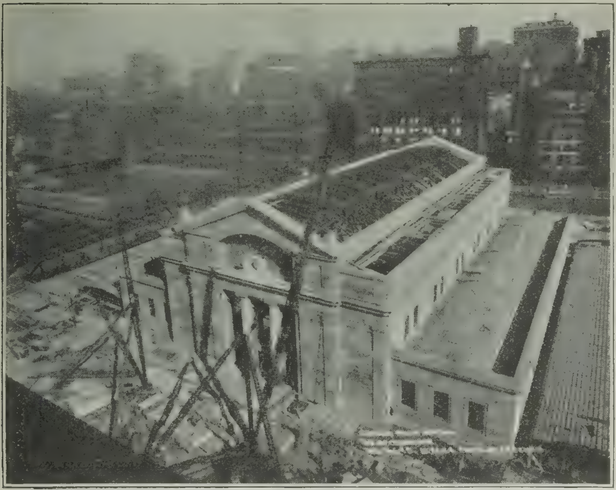
Culmination of the Labor Struggle

The legacy from Federal control of inadequate revenues to meet the increased cost of operation hung like a pall over the

SKELETON CONCOURSE CHICAGO UNION STATION FROM THE RIVER. MAIN BUILDING IN BACKGROUND. Oct. 1924.

railway situation at the opening of 1922. The problem had resolved itself into a demand from farm and factory for a lowering of freight rates and a stubborn insistence on the part of certain blocs of railway labor that there should be no lowering of the wage scale, by which alone a reduction in freight rates was economically possible. Not having the power of taxation behind them with which to make good half-a-billion-a-year deficits, as Directors General McAdoo and Hines had, the carriers could only rely on a readjustment of wages to meet the reduction in rates which the Commis-

sion had reluctantly ordered. This reduction was decreed by the Commission on May 16, 1922, effective July 1 following. Taking the increased ratio in 1920 as a basis, it was ordered that the advance of 40 per cent then made in Eastern territory be reduced to 26 per cent, the 35 per cent for the Western group was reduced to 21.5 per cent and the 25 per cent advance in the Southern and Mountain-Pacific groups was re-



CONCOURSE, CHICAGO UNION STATION
As seen from roof of Main Building, Oct. 22, 1924

duced to 12.5 per cent. It was estimated that this decision would reduce the operating revenues by some $400,000,000, but the recovery in traffic made up for the reduction in rates. The Commission based its decision on an anticipation that with normal traffic the revised rates would yield over $900,000,000 net operating income, or some $100,000,000 more than it actually did.

On June 6 the Labor Board ordered a reduction of shopmen's wages amounting to from 5 to 10 cents an hour and

authorized other reductions for other railway employes except those of the four brotherhoods. The shopmen immediately announced that unless the Board rescinded its action a strike would be ordered on July 1. On the Board's refusal to yield, the strike was duly declared. Between 200,000 and 250,000 shopmen dropped their tools. The subsequent official figures showed that the strike was far from being unanimous. The

CHICAGO UNION STATION AND CONCOURSE
Nearing completion October, 1924

shopmen on the pay roll at the middle of June numbered 346,366; on the middle of July they numbered 117,305, and on the middle of August 188,235. By the middle of September the shopmen at work numbered 270,374 and by the middle of October 366,530, showing that so far as the railways were concerned the strike was over, although Federation leaders persisted that it was still on with those roads that had declined to restore seniority rights to returning strikers.

Upon this question of restoring seniority rights to returning strikers, there was a radical cleavage in the policy of the leading railway companies. One party that had been most active in recruiting its forces through assurances that

workers taking the place of strikers would be given permanent jobs, if proved capable, and who had warned the shopmen that they forfeited their seniority rights if they did not return within a specified time, felt in honor bound to abide by their promises. The other party accepted what was known as the Baltimore Agreement, which, among other things, provided that all men were to return to work in positions of the class they originally held on June 30, 1922, and at the same point, "at present rates of pay." The principal roads signing this agreement and also those that declined to restore seniority to strikers were as follows:

Baltimore Agreement—
Baltimore & Ohio
Chicago, Milw. & St. Paul
New York Central
Southern Railway
Chesapeake & Ohio
Seaboard Air Line
Chicago & Northwestern
Michigan Central
Western Pacific
Mobile & Ohio
Cincinnati, N. Orleans & Tex. Pac.
Erie
Chicago Great Western

Seniority Not Restored—
Atchison, Topeka & Santa Fe
Chicago, Burlington & Quincy
Chicago, Rock Island & Pacific
Illinois Central
Great Northern
Kansas City Southern
Atlantic Coast Line
Louisville & Nashville
Lehigh Valley
Southern Pacific
Union Pacific
Pennsylvania
Missouri, Kansas & Texas
New York, New Haven & Hartford
Boston & Maine
Chicago & Eastern Illinois
Central R. R. of New Jersey
Delaware, Lackawanna & Western
Delaware & Hudson
Chicago & Alton
Denver & Rio Grande
Minneapolis, St. Paul & S. S. Marie
Missouri Pacific
Northern Pacific
St. Louis-San Francisco
Texas & Pacific

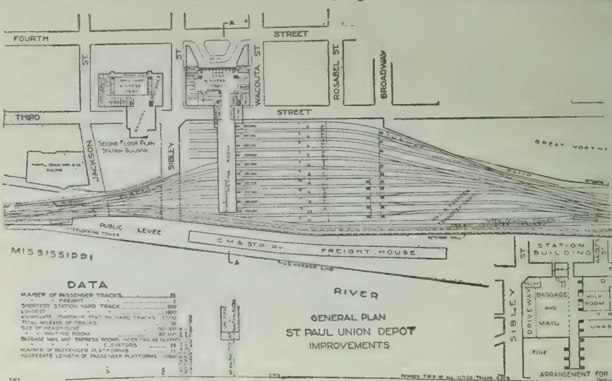
In the final roundup it was found that approximately 20 per cent of the shopmen went back under the Baltimore Agreement and 67 per cent settled by agreements with the roads that held fast to the forfeiture of seniority rights by employes going on a strike after due notice.

But the strike had other far reaching consequences. In its early stages it was accompanied with acts of lawlessness, violence and sabotage, and these grew to be so numerous

and desperate that the Attorney General obtained an injunction in the U. S. District Court in Chicago forbidding strikers and union officials from interfering in any manner with the operation of the railroads. This injunction was made permanent and today stands as a bulwark protecting railway operation throughout the United States from destructive attacks in labor struggles.

St. Paul's New Union Station

If the reader will take a map of the vicinity of St. Paul and Minneapolis he will quickly perceive that neither was



TRACK LAY-OUT ST. PAUL UNION STATION

the ideal terminal for the various railways which center there. The topographical spot for a railway serving two cities with an aggregate population of over 600,000 would have been the bend of the Mississippi River where it is joined by the Minnesota River. The outpost Fort Snelling would have been an ideal location. But no such look into the future determined the site for this double-doored gateway of the Northwest. Circumstances decreed that they should be located on different sides of the "mighty waters" that they might pursue their distinct ways to their present metropolitan and business importance.

The site of St. Paul was probably chosen because it was convenient to the head of deep water navigation on the Mississippi and was on the eastern shore of the stream that for a decade separated civilization from the boundless West. The Falls of St. Anthony, only ten miles from St. Paul as the crow flies, and nearer twenty by the river, had within its tumultuous waters the secret and potentiality that fixed the

FRONT VIEW, UNION STATION ST. PAUL, 1923
Photos—Northwestern Photographic Studios.

destiny of Minneapolis as the milling center not only of Minnesota and the United States but of the world. So diverse stars presided at the birth of these twin cities.

St. Paul was settled in 1838 and chartered in 1854, by which time Minneapolis was a thriving village of some 500 pioneers. In 1860, when the first census enumerator appeared on the scene, St. Paul had a population of 10,401 to Minneapolis' 2,564. For a few years St. Paul had the advantage given it by that first locomotive that landed on its banks from a steamboat from Dubuque, and forged ahead. But before the

census taker of 1880 came around the railways had brought prosperity and increased population to the younger city.

In 1862, according to James J. Hill, "the whole railroad system of Minnesota, the gateway to the newer portion of the Northwest, was comprised in ten miles of track connecting St. Paul and St. Anthony"—mind you, a bridge across the river had still to be built.

UNION STATION, ST. PAUL, MINN.
Progress of work from Robert Street Bridge.
Photos—Northwestern Photographic Studios.

In 1920 the population of St. Paul was 234,698, while that of Minneapolis was 380,582, both cities owing their wonderful development to the iron horse that had come out of the East only sixty years ago to make distant fields and forests tributary to their flouring and lumber mills.

Minneapolis, being dominated by only two or three lines, had no difficulty in providing itself with an ample passenger terminal; whereas St. Paul, being the center of half a dozen diverse railway interests and having a very difficult problem, terminal and through service, to solve, delayed its plans for

a union station until the demand became imperative. Once decided upon, the work of replacing the old station with a new one without abandoning the old was pushed with great energy, with the result that St. Paul has now one of the most modern passenger terminals in the country. The illustrations of the layout and progress of the work given herewith incate the difficulty of the task that has been accomplished.

MAIN CONCOURSE, ST. PAUL UNION STATION

The Struggle Back to Normal

With the labor situation somewhat clarified by the collapse of the shopmen's misguided strike of July 1, and the adjustments with the Government over the return of the roads to private operation nearer settlement, the railways in the autumn of 1922 set themselves the task of adapting inadequate facilities to the demands of increasing traffic. For ten years, 1912 to 1922, construction of new line had been practically at a standstill, being barely sufficient to offset the mileage abandoned, which, in the meantime, had amounted to over

6,000 miles—mostly of small lines and little or no traffic.

The shifting nature of railway classification by revenues at $1,000,000, $100,000 and below, as well as the paralysis of progressive construction during the decade 1912 to 1922, is set forth in the following statement:

	Miles of Line Operated			
Year	Class I	Class II	Class III	All Classes
1912	218,247	20,288	9,446	247,981
1913	222,289	20,183	9,052	251,524
1914	225,007	20,398	9,149	254,554
1915	227,025	19,570	8,955	255,550
1916(a)	229,258	18,914	9,033	257,205
1917	230,611	18,440	8,867	257,618
1918	231,112	17,592	7,770	256,474
1919	232,411	16,966	7,195	256,572
1920	233,285	17,868	6,839	257,992
1921	234,702	17,432	6,228	258,362
1922	234,986	16,500	5,458	256,944
Inc. per cent	7.6%	D 18.6%	D 42.2%	3.6%

(a) Year ending December 31. D. Decrease.

The figures for Class 2 and Class 3 in 1922 are subject to revision when the official annual reports are compiled. Rec-

WHERE NATURE DWARFS THE WORKS OF MAN
Grand Canon Arizona, from North Rim

ognizing the defect of instability in classifying roads by the fickle unit of revenues of successive years, the Commission on November 20, 1920, adopted the revenues of the calendar year 1919 as the basis for classification.

Not since the second decade of American railway history has there been such an insignificant addition to the Nation's main line of transportation as during the period covered in the above statement. Of the 16,739 increase credited to Class 1 roads, at least one-half was taken over from the other classes, principally by reason of the advance in rates in 1918 and 1920. During this period over 7,000 miles of line were abandoned, against something like 10,000 miles of new construction.

It was only through the construction of some 30,000 miles of auxiliary track—that is, second, third and other track and yard track and sidings—that the railways were able to cope with the heavy demands made upon them during the war and since in the normal development of national production and commerce. What that amounts to since 1912 is shown in the following figures for Class 1 roads:

Year	Tons of freight carried one mile	Passengers carried one mile
1922	339,285,347,571	35,469,841,029
1912	259,981,628,198	32,316,262,549
Increase per cent	31.9%	9.7%

Two causes have operated to keep the passenger traffic from increasing relatively to population, which increased approximately 15 per cent during the decade—the diversion of travel to motoring, both in touring and suburban rides, and the advance in average passenger rates from two to three cents. With an increase of less than 10 per cent in passenger mileage there was an increase of nearly 68 per cent in passenger revenues. In freight receipts the combination of increased tonnage, 31.9 per cent, and increased rates raised the receipts from $1,897,692,838 in 1912 to $3,992,442,459 in 1922, or 110 per cent.

The growth of railway service is measured by the traffic movement and not by revenues, which in this case were

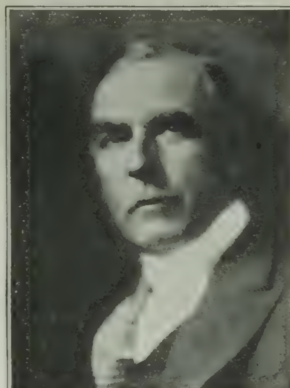
swelled by rates and fares advanced to meet an increase of over 120 per cent in the compensation of employes.

But it was left for the year 1923 to demonstrate the return of the railways to more than pre-war efficiency. Operating on what sailors call "an even keel" throughout the year, with no untoward circumstances in the way of strikes or regulatory reactions; with only minor adjustments of rates and wages to upset the reasonable anticipation of transportation demands, the railways of the United States in 1923 succeeded in handling the greatest volume of freight in their history. Except for the abnormal movement attendant on the assembling and disbanding of an army of over 4,000,000 men during 1917-1920, the same would have been true of passenger traffic. Only figures can tell the full story of the magnitude of what energetic and concerted railway management accomplished in 1923. Using the year 1916, their most successful year before the war, for comparison, the essential figures for Class 1 roads in 1923 were as follows:

Item	1916	1923
Operated Mileage	229,525	234,759
Miles all track	364,137	382,101
Locomotives	61,013	64,879
Passenger cars	52,179	54,834
Freight cars	2,280,955	2,314,389
Passengers carried	1,005,954,777	985,908,000
Passengers carried 1 mile	34,585,952,026	38,005,922,000
Freight tons carried	2,179,696,043	2,312,200,000
Freight tons carried 1 mile	362,444,397,129	413,562,132,000
Passenger revenues	$706,608,630	$1,147,365,989
Receipts per passenger mile	2.042 ct.	3.029 ct.
Freight revenues	$2,560,988,111	$4,613,954,874
Receipts per ton mile	.707 ct.	1.116 ct.
Total operating revenues	$3,596,865,766	$6,356,890,737
Total operating expenses	2,357,398,412	4,943,928,145
Operating ratio	65.54%	77.77%
Taxes	$ 157,113,372	$336,381,765
Rent of equipment and facilities	41,471,979	96,847,506
Net operating income	1,040,882,000	977,657,368
Number of employes	1,647,097	1,879,770
Compensation	$1,468,576,394	$3,043,161,163
Average per year	$891	$1,619
Per cent of revenues	40.8%	47.9%

With this exhibit of the wonderful recovery of the railways under private operation from the tribulations and disorganization under Federal control, our record of their amaz-

ing accomplishment is properly rounded out by the completion of two great union stations in Chicago and St. Paul as illustrated in preceding pages. The sites of these two cities were Indian trading posts, unmarked on the maps accessible to Carroll of Carrollton when he turned the first sod of the Baltimore & Ohio, ninety-seven years ago. Today their place in the industrial life of the republic and as great railway centers justifies the erection of two of the largest passenger stations in the world, embodying in their construction every convenience and requirement of modern railway travel.

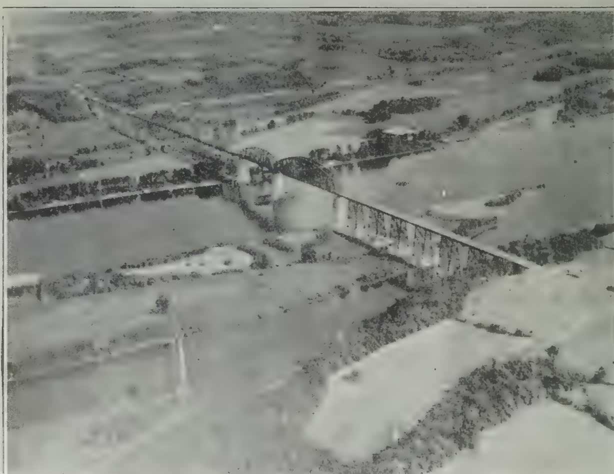

THE LATE A. H. SMITH

The Castleton Cut-off

One of the first principles of railway location is to straighten out as nearly as possible all angles, for the perfect railway is a straight level line between two places. Being practically impossible, it remains the objective of all the realignment and reduction of curves that figure constantly in railway betterments and improvements. The latest instance of this rectification of a long standing obstruction to economic operation of increasing traffic was the opening of the so-called "A. H. Smith Memorial Bridge" over the Hudson at Castleton. The necessity for this was a legacy of 1830, when the Albany to Schenectady was built.

If the reader will take a straight edge rule and run a line on the map of New York State from Castleton to Hoffmans, a few miles west of Schenectady, he will perceive how modern engineering gets around the acute angle in the New York Central's main line to Chicago at Albany. The bridge across the Hudson also obviated the necessity of running freight trains for Boston through Albany.

The accompanying map shows the advantages of the new cut-off in point of distance, but it does not tell of how it avoids the steep grades and low level bridges at the head of navigable water in the Hudson. It was steamboat traffic that made Albany the gateway for early western transportation, and now the increase of traffic has made the expenditure



CASTLETON CUT-OFF—SHOWING BRIDGE OVER HUDSON

of $25,000,000 on this cut-off an economic investment for the railways.

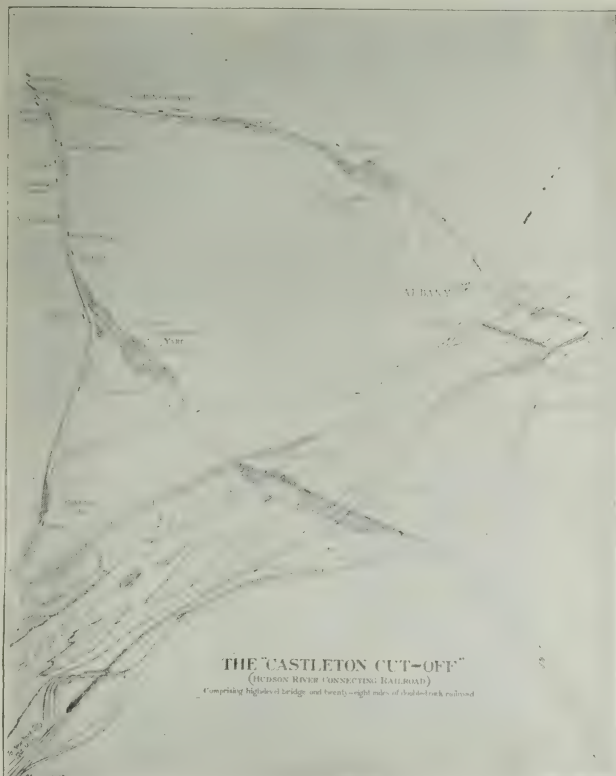
The picturesque as well as the engineering feature of this cut-off is the bridge, which is a double track through truss steel structure. It consists of two river spans of 600 and 400 feet, respectively, resting upon three massive stone and concrete piers.

The map shows the location at Selkirk of one of the largest and most efficiently equipped terminal freight yards in the world, with a present capacity of 11,000 cars. It has two

electrically operated switching humps for handling east and west bound business, respectively.

Capitalization in 1848 and 1923

Throughout this history of the American railways the question of their capitalization has been the "poor relation" that presided at their birth and haunted every proposal for their extension, expansion and nourishment. There has never



THE "CASTLETON CUT-OFF"
(HUDSON RIVER CONNECTING RAILROAD)
Comprising high-level bridge and twenty-eight miles of double-track railroad

been a time, since Carroll of Carrollton turned the first spade of dirt for the Baltimore & Ohio Railroad down to the check for $100,000 paid last year for a single locomotive, that every dollar spent for that spade or that locomotive has not been suspected of concealing "Water." No decade reviewed in the preceding chapters has been without its indiscriminate cry of "Water! Water!", the implication being that the stated capitalization of all the railways far exceeded the amount invested in them.

Investment in Early New England Roads

In 1848 a committee of the Massachusetts legislature made an investigation of the railroads of the commonwealth and reported the following facts:

Length of roads, miles	954.3
Length of double track, miles	220.2
Capital	$50,004,100
Capital paid in	37,009,560
Cost	46,777,009

As the list of roads covered by this statement included several unfinished lines, the committee presented another table of 28 completed roads with a total of 913 miles of main track and 89 miles of branches which had cost $43,865,256, or $43,781 per mile. Elsewhere in the report it appeared that the discrepancy between the capital paid in and the capital was made up by an indebtedness of $12,420,201 and other items.

The committee also calls attention to the fact that the average cost of 4,420 miles in England in 1848 was about $142,000 per mile and added: "There is no road in this country which cost the average of the English lines, excepting, perhaps, the Reading Railroad in Pennsylvania."

How near the surmise of the Massachusetts committee was to the truth is shown by the following figures from the Reading Railroad's balance sheet of November, 1848:

Railroad	$11,264,715.41
Depots	205,324.87
Locomotive engines and cars	2,278,326.36
Real estate	478,514.52
Total	$14,226,881.16
Per mile, 93 miles	152,977.00

Unlike a majority of the roads at that time, the Reading was double tracked all the way.

One-sixth of the railway mileage of the United States was covered in the review of the Massachusetts committee in 1848. The population of the Republic has grown from 22,000,000 in 1848 to, say, 112,000,000 in 1924, or well over 400 per cent, but the railway mileage has increased over 4,000 per cent. In 1848 there was only one mile of railway to some 3,600 inhabitants, where there is one mile of line to about 420 inhabitants now.

That it has taken millions and billions of dollars to work this amazing transformation no serious, straight-minded student will question. Water does not run up hill at that rate. Therefore it is not surprising to find the seeming miracle represented in such official capitalization figures as these for 250,000 miles of operated line:

Capital stock	$ 7,626,037,584
Funded Debt	11,961,375,063
Receivers' certificates	6,943,968
Total 190,000 miles owned and 60,000 miles rented	19,594,356,613

For the purposes of this statement the rental of non-operating roads is capitalized as offsetting their capitalization, thus sidestepping the pitfall of intercorporate relations.

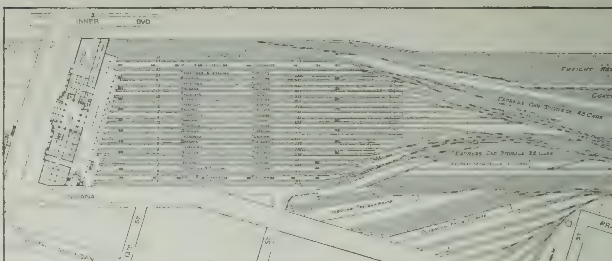
The total investment reported for the same roads to December 31, 1922, was $20,961,692,520; and so we have—

Capital per mile of operated line	$78,377
Investment per mile of operated line	83,846

If the reader is inclined to question the relative reasonableness of these figures compared with the findings of the Massachusetts committee in 1848, let him compare the railway of 1848, as symbolized in the Pioneer locomotive landed in Chicago that year, with the last locomotive illustrated in this book, and he will get a clearer realization of the cost of the railway service at the disposal of Americans today at lower rates than prevailed then.

In the presence of such impressive figures and facts, the official valuation of the railways made by the Interstate Commerce Commission in 1920, of $18,900,000,000, seems easily

within the mark. If it were possible to summon every dollar sunk irrevocably in right of way, rail, tie, station, bridge, viaduct, culvert, locomotive, car, shovel, tool, machine, signal, safety device, convenience and patent contraption of American railways from the opening of the Quincy tramway until now, it would present a column of figures whose sum would reach billions beyond the vast totals that can be accounted for. The vastness of its minutiae precludes its attempt.



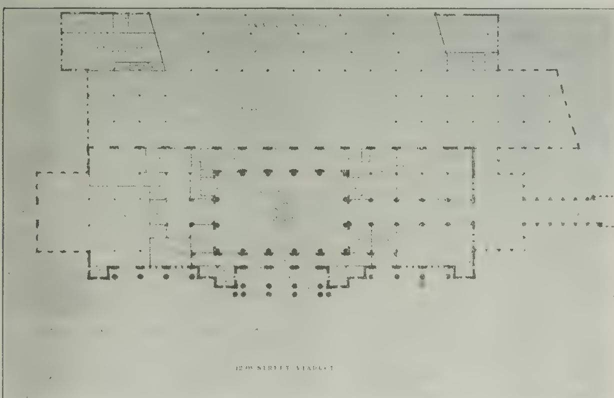
LAY-OUT OF THE NEW ILLINOIS CENTRAL TERMINAL

Moreover, the brains, the vision, the adaptation of small means to great ends that has attended the building and management of American railways is a priceless heritage worthy of a place in the annals of the Republic only one step below that accorded to its founders and preservers.

THE LATEST PASSENGER STATION

Many of our readers who have followed this brief history may have come into the passenger station of the Illinois Central when it was located at the foot of Randolph Street, Chicago, in the early 50's. Many more have passed through the company's "new" station opened April 17, 1893, at Park Row, for it was there during the World's Fair. And now, just as it has become inadequate through a like expansion of traffic, it is to be succeeded by a modern structure and terminal that is intended to embody every convenience adopted in railway passenger service.

Only the tentative plans are available at this writing. But their general features must conform to the necessary confines of the situation—a terminal for through traffic that shall not interfere with one of the most necessary and densest suburban services in the United States; electrification of all tracks passing through to the vast freight yards that open like a fan from Madison Street to the Chicago River and a head house that shall accommodate the ever-expanding passenger traffic

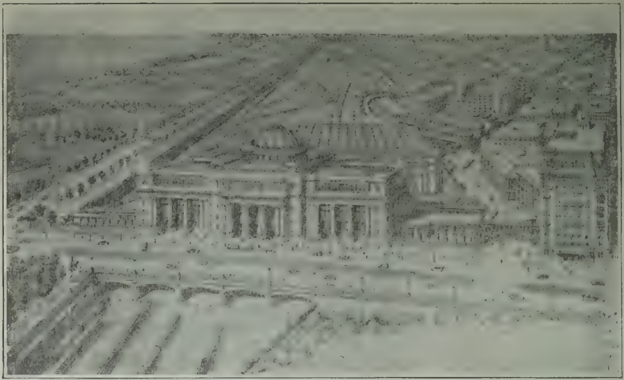


GENERAL PLAN HEAD HOUSE AND CONCOURSE

of the Illinois Central, with its direct connections that range all the way from Minneapolis in the Northwest to Jacksonville in the Southeast, and of the Michigan Central and its immediate connections through Detroit and Buffalo with the East.

The new station will front on Twelfth Street, a short block south and somewhat east of the present building. It will be the third noteworthy structure of the three that form a triangle with the Field Museum and the Municipal Stadium at the southern end of Grant Park.

The architects' drawings must suffice to give an idea of what this new addition to America's monumental passenger



stations will be, and one or two like it are contemplated before Chicago is equipped for the second century of rail transportation in the United States.

Is This to Be the Last Word in Steam Locomotives?

STEAM TURBINE LOCOMOTIVE
Exhibited by Krupp Works at the Railroad Fair, Berlin, 1924.
—Photos, Gilliams Service, New York

CHAPTER XII

THE RAILWAY DOOR OF OPPORTUNITY

"The man's the gowd for a' that."—Burns.

IN no other occupation does the eye to see, the hand to do and the sane mind in the sound body find its due reward with more certainty than in the railway service. Its doors of opportunity swing inward to the multitude who are annually entered on its rolls. It is a steep climb from the bottom rung, which is open to all, to the top of one of the hundreds of companies; but the footing is sure and the rewards increase with every step. The goal of place, honor and competence is always there to him who brings to the service energy, industry and the spirit to succeed. And all along the way the railroad employe has the satisfaction of knowing that he is engaged in a useful and necessary public service.

MARVIN HUGHITT IN 1873

That these are no idle words is proved by the following brief biographical notes of the men who today are at the head of the leading railway systems of the country.

Beginning with Marvin Hughitt, whose eyes, undimmed at eighty-seven, have seen the railways of the United States expand from their first thousand to 250 thousand miles. He was born at Genoa, New York State, in 1837, before the railway had penetrated that far into the wilderness, but he sailed his boyhood boats on the Erie Canal. At the age of sixteen he entered service of the telegraph company at Syracuse as a messenger boy, less than ten years after Morse had patented his invention. In 1854 he migrated to Chicago, entered the railway service as a telegraph operator and by 1862 had reached the position of trainmaster on the St. Louis, Alton &

MARVIN HUGHITT—1924
—Steffens, Chicago

Chicago Railroad; from 1862 to 1864 he was superintendent of the Southern Division of the Illinois Central, then general superintendent of the same road until 1870; assistant general manager of the Chicago, Milwaukee & St. Paul; and general manager of the Pullman Palace Car Company, 1871 to 1872. Since that date he has been connected with the Chicago & North Western successively as general superintendent, general manager, vice-president, president, 1887-1910, and chairman of the Board of Directors since then—over 70 years in railway and public service.

After this brief outline of length of service, the career of the present head of the great system that harks back to the Camden & Amboy Railroad of 1830 engages attention. Samuel Rea, president of the Pennsylvania Railroad, was born at Hollidaysburg, Pa., in 1855. At sixteen he entered the railway service, in the engineering department. The accompanying portrait shows him engaged in the same work as illustrated in Lyman Abbott's story of the building of the Erie. From 1874 to 1875 Mr. Rea held a clerical position with the Hollidaysburg Iron & Nail Company. In 1875 he re-entered the Pennsylvania's service in the engineering corps, in which by 1883 he had risen by successive steps to be principal assistant engineer of the system; assistant to second vice president (1888);

SAMUEL REA
AT 22
—When engaged in survey of the Pittsburgh & Lake Erie R. R.

out of the service from 1889 to 1892; then returned to service as assistant to president; fourth vice president (1899); successively third, second and first vice-president; president since 1913; supervised construction of New York terminal extension and station. It was the good fortune of Mr. Rea to enter the service of the Pennsylvania when it was under the management of A. J. Cassatt, who rose from rodman in 1861 to general manager in 1870 and president in 1899 to 1906.

SAMUEL REA—1924

Patrick E. Crowley, president of the New York Central Lines, affords a typical illustration of the railway road from the common lot to high distinction. Born in 1864, at the age of twelve Mr. Crowley was a messenger boy in his father's station on the Erie at Cattaraugus, New York, earning five dollars a month. He entered the service of the Erie as a telegraph operator at fourteen and by 1888 had risen to train dispatcher on the Rome, Watertown & Ogdensburg, now a part of the New York Central. From then on his promotion has been rapid. By 1904 he was assistant general

PATRICK E. CROWLEY

DANIEL WILLARD

superintendent of the New York Central, and 1916 found him vice-president in charge of operation of the same road. In 1924 he succeeded to the presidency on the tragic death of A. H. Smith, whose career from messenger boy to president had been a close counterpart of the long hours of labor and "nights devoid of ease" by which Mr. Crowley fitted himself for one of the most responsible and arduous offices in the railway world.

Daniel Willard, president of the Baltimore & Ohio, another of the early roads, is one more instance of how the highest office in railway service beckons the ambitious boy from the humblest station in life. Born in Vermont in 1861, he was a railway track laborer at eighteen on the Central Vermont Railway. From then on he has been locomotive fireman, engineer, roundhouse foreman and trainmaster, until at 37 he had risen to superintendency of the Minneapolis, St. Paul & Sault Ste. Marie road. Thence he went to the Baltimore & Ohio as assistant general manager in 1901; second vice-

FRANK H. ALFRED

president in charge of operation of the Chicago, Burlington & Quincy, 1904-1910; and president of the Baltimore & Ohio since then.

L. W. BALDWIN
Moffit Photo. Courtesy Railway Review.

But the inspiring tale of how these men, irrespective of the circumstance of birth, worked themselves up to places of great responsibilty must be curtailed to the barest outline. Taking them in alphabetical order, the review of each in main is restricted to where they began, when they arrived and their present position.

Frank H. Alfred, president Pere Marquette Ry., entered service in 1887, when 21 years old, as rodman on construction Columbus, Lima & Milwaukee R. R; 1889-1894, assistant engineer Norfolk & Western R. R. construction work at Columbus, O.; assistant, then chief engineer, Pere Marquette 1900-05; out of service three years; with Cincinnati, Hamilton & Dayton Ry. 1908-12; general manager for receivers Pere Marquette 1912-17; president and general manager since 1917.

W. G. BESLER AT 21

Lewis W. Baldwin, president Missouri Pacific R. R., entered service of Illinois Central R. R. in 1896, when 21 years old, as chainman; successive positions 1896-1915 on same road up to general superintendency of southern lines; 1915-18 vice-president and general manager of Georgia Ry.; assistant regional director under U. S. administration 1918-20; vice-president Illinois Central 1920-23; present position since 1923.

William G. Besler, president Central R.

WILLIAM G. BESLER
—Pach, New York

R. of New Jersey, entered service of the C., B. & Q. R. R. at Galesburg, Ill., as trainmaster's clerk; transferred to general offices in Chicago, becoming private secretary to general manager and chief clerk in general superintendent's office; Massachusetts Institute of Technology 1884-88; re-entering the service on the same road as night trainmaster, subsequently trainmaster and division superintendent, 1888-99; superintendent Reading and Lebanon divisions and general superintendent Philadelphia & Reading Co. 1899-1902; general manager and vice-president Central R. R. Co of New Jersey 1902-14, president since 1922.

Ralph Budd, president Great Northern Ry., entered service of Chicago, Great Western as rodman in 1899, when 22 years old; in engineering department same road 1899-1902, advancing to assistant engineer, superintendent construction and division engineer Chicago, Rock Island & Pacific 1902-06; chief engineer Panama R. R. 1906-09; chief engineer Great Northern Ry. 1913-14, and present office since 1919.

RALPH BUDD

H. E. Bryam, president Chicago, Milwaukee & St. Paul Ry., entered service of Chicago, Burlington & Quincy R. R. as call boy in 1881, when 16 years old; out of service 1889-1894; re-entered with Great Northern in latter year; superintendent Cascade division that road 1899-1902; vice-president C., B. & Q. R. R. 1910-17; president C., M. & St. P. Ry. since 1917.

AGNEW T. DICE

Agnew T. Dice, president Philadelphia & Reading Ry., entered service with Pennsylvania R. R. in 1881, when 19 years old, as flagman with engineering corps; rodman and assistant engineer 1887-88; various positions same road up to supervisor 1888-92; superintendent of signals New York Central & Hudson River Ry. 1892-93; superintendent Shamokin division Philadelphia & Reading Ry. 1897-1903; general superintendent, general manager, vice-president same consecutively 1903-16; present position since 1916.

HOWARD ELLIOTT
—Underwood & Underwood

Howard Elliott, chairman Northern Pacific Ry. and New York, New Haven &

SAMUEL M. FELTON AT 30
When Vice-president of the Erie
—Photo L. Almon

Hartford R. R., graduate Lawrence Scientific School, Harvard, entered service of Chicago, Burlington & Quincy R. R. in 1880, during vacation, as rodman, when 20 years old; held various clerical positions up to general freight agent Hannibal & St. Joseph R. R. 1891-96; second vice-president Chicago, Burlington & Quincy 1902-03; president Northern Pacific 1903-13; 1913 to 1917 president and chairman New York, New Haven & Hartford; 1917 to 1920 president Northern Pacific and present position since 1920.

Samuel M. Felton, president Chicago Great Western R. R., graduated as civil engineer from Massachusetts Institute of Technology in 1873 at the age of 20; chief engineer Chester & Delaware River R. R. 1873-4; general superintendent Pittsburgh, Cincinnati & St. Louis Ry. 1874-81; general manager New York & New England R. R. 1882-84; vice-president New York, Lake Erie & Western R. R. 1885-90; president Cincinnati, New Orleans & Texas Pacific Ry. 1890-99; also receiver for that and various other roads after the panic of 1893; president of Chicago & Alton and affiliated roads 1899-1907; president Mexican Central 1907-09; president and receiver Pere Marquette 1912-1914; director general of Military Railways U. S. Army 1917-18; present position since 1909. The lives of Mr. Felton and his father cover 79 years of railway service.

SAMUEL M. FELTON—1924

William H. Finley, president Chicago & North Western Ry., entered service as draftsman on the Chicago, Milwaukee & St. Paul Ry. in 1887, when 25 years old; engineer of bridges Chicago & North Western 1892; chief engineer same road 1913; president same road since 1918.

WILLIAM H. FINLEY

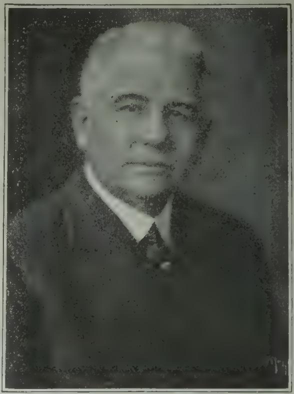
James E. Gorman, president Chicago, Rock Island & Pacific Ry., entered railway service with the C., B. & Q. at 13 as car number taker; with the Chicago, Burlington & Quincy for four years, then held various positions with the Rock Island, the Chicago Lumber Co., Chicago & North Western, Sante Fe, and Illinois Central, moving upward, until 1895, when he was chief clerk of the Sante Fe, becoming freight traffic manager of the same road in 1905; went back to Rock Island as first vice-president in 1909; chief executive under receiver in 1915 and president since 1917 except for period of Federal control, when he served as Federal manager.

JAMES E. GORMAN

Carl R. Gray, president Union Pacific System, entered service of St. Louis & San Francisco R. R. as tele-

CARL R. GRAY AT 15
—J. E. Crouch, artist, Fayettesville, Ark.

graph operator in 1882, when 15 years old; by 1897 he had risen to be division superintendent; by 1900 superintendent of transportation; by 1904 general manager, and by 1909 senior vice-president—all with the same road; president of Spokane, Portland & Seattle Ry 1911-12; president Great Northern Ry 1912-14; president Western Maryland Ry. 1914-17; director Division of Operation U. S. Railroad Administration 1918-19; and president Union Pacific since January 1, 1920.



CARL R. GRAY
—Moffet, Chicago

FAIRFAX HARRISON

Fairfax Harrison, president Southern Railway System, admitted to the bar in New York in 1892, when 23 years old, in practice until 1896, when he entered railway service as solicitor of Southern Ry.; assistant to president and vice-president of same road until 1910; then president of the Chicago, Indianapolis & Louisville (Monon) Ry. until 1913, since then President Southern Railway and affiliated roads.

Hale Holden, president Chicago, Burlington & Quincy

Ry., after graduating from Harvard Law School practiced law in Kansas City until 1907, when at the age of 38 he entered railway service as general attorney for road named; assistant to president 1910-12; vice-president 1912-14; president 1914-18; regional director Central Western region 1918-20; present position since 1920.

HALE HOLDEN

Mr. Holden succeeded Darius Miller, who himself entered railway service at the age of eighteen as stenographer in the general freight office of the Michigan Central.

William J. Jackson, president Chicago & Eastern Illinois Ry., entered service in 1877, when 18 years old, with Grand Trunk Ry. as machinist's helper; 1878-81 freight clerk same road; 1882-85 chief claim clerk Chicago & Grand Trunk Ry. at Chicago; 1891-93 assistant local freight agent Chicago & Eastern Illinois; since 1893 various positions same road up to president and receiver, 1913-1918; federal manager 1918-20; receiver and president since.

DARIUS MILLER

WILLIAM J. JACKSON AT 20

WILLIAM J. JACKSON

John R. Kenly, president Atlantic Coast Line R. R., entered service as construction engineer Pittsburgh & Connelsville R. R. in 1871, when 22 years old; superintendent Richmond & Petersburg R. R. 1882-85; various positions on Atlantic Coast Line 1885 to 1913, and since that his present position.

JOHN R. KENLY

JULIUS KRUTTSCHNITT
Died June 15, 1925.

Julius Kruttschnitt, chairman Southern Pacific Company, was born in New Orleans in 1854, graduated as a civil engineer at Washington & Lee University, assistant teacher in McDonough's School, near Baltimore, 1873-78; entered railway service at 24; general manager Atlantic system Southern Pacific Co. at 35; general manager of all Southern Pacific lines at 41; director of maintenance and operation Southern Pacific Co.,

Union Pacific R. R., Oregon Short Line and Oregon-Washington R. R. & Navigation Co. at 50, and chairman Southern Pacific Company 1913 until retirement in 1925.

J. M. KURN
—Straus' Photograph

James M. Kurn, president St. Louis-San Francisco Ry., entered service in 1885, when 15 years old, as telegraph operator on the Michigan Central R. R.; transferred to Atchison, Topeka & Santa Fe in 1887 in same capacity, becoming train dispatcher in 1891 and chief dispatcher in 1900; trainmaster Pueblo in 1901; promoted to division superintendent Rio Grande division 1905; superintendent New Mexico division 1906-10; general superintendent western lines 1910-14; 1914-18 president Detroit, Toledo & Ironton R. R.; first vice-president St. Louis San Francisco 1918 and general manager during Federal control; present position since March 1, 1920.

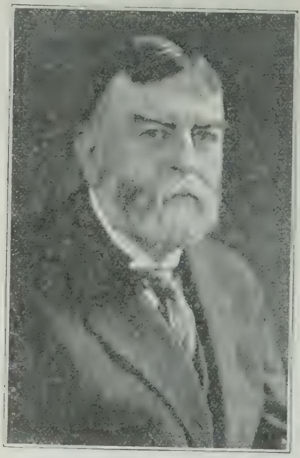
ROBERT S. LOVETT
—Underwood & Underwood

Robert S. Lovett, chairman Executive Board Union Pacific System, entered railroad service at 24 in 1884 as local attorney of Houston East & West Texas R. R.; general attorney for all Southern Pacific lines in Texas 1892-1903; general counsel for Union Pacific and Southern Pacific affiliated lines 1904-09; chairman Executive Committee and president Union Pacific and Southern Pacific systems since 1909-13 (when relations of two systems were dissolved), chairman Executive

Committee Union Pacific since 1913, and director of capital expeditures under United States Railway Administration 1918-1920.

L. F. Loree, president Delaware & Hudson Co. and chairman Executive Committee Kansas City Southern Ry., entered service Pennsylvania R. R. as assistant in engineer corps in 1877, when 19 years old; 1883-84 assistant engineer Chicago division Pennsylvania lines west; president Baltimore & Ohio R. R. 1901-04; chairman Executive Committee Chicago Rock Island & Pacific Ry. and affiliated companies January to October, 1904; chairman Kansas City Southern since 1906, and president and chairman Delaware & Hudson Co. since 1907.

L. F. LOREE AT 20



L. F. LOREE

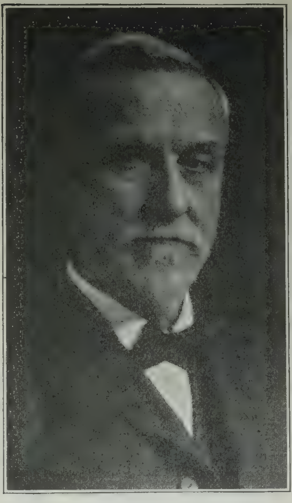
Charles H. Markham, president Illinois Central R. R. and Yazoo & Mississippi Valley R. R., entered railway service as section laborer on the Atchison, Topeka & Santa Fe in 1881; various positions on Southern Pacific successively up to general manager 1881-1904; out of railway service 1904-1911; president Illinois Central and affiliated companies 1911 to date.

C. H. MARKHAM AT 20

W. L. Mapother, president Louisville & Nashville R. R., entered service as office boy in secretary's office that road in 1888, when 16 years old; rose through various positions to chief clerk Executive Department in 1904; assistant to president one year; first vice-president in 1905-18; Federal manager 1918-20; succeeded to presidency in 1921 on the death of **Milton H. Smith,** a heroic figure in the public and railway life of the South. The accompanying portrait of Mr. Smith was furnished by his successor in lieu of an earlier one of himself. Mr. Smith's record, itself reading like a romance, was typical of those hardships, struggles and long hours of work and study by which railway officials have breasted the currents of life to win recognition and success. He was born a year earlier than his contemporary, Marvin Hughitt, and entered railway service as an operator and clerk; he was with the military railways of the South during the war; after that he held positions with the B. & O. and Pennsylvania railroads until 1882. From that time he was identified with the Louisville & Nashville, as IT with HIM, from 3d vice-president to President (1891), dying in harness in 1920.

CHARLES H. MARKHAM
Regional Director of the Allegheny Region Under Federal Control—1918-19.

W. L. MAPOTHER



MILTON H. SMITH

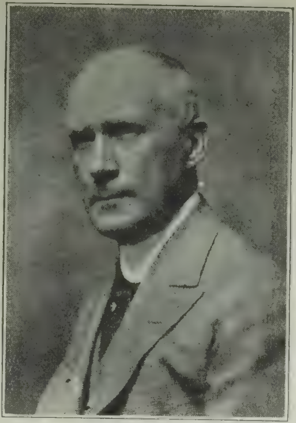
Edmund Pennington, chairman of Board Minneapolis, St. Paul & Sault Ste. Marie Railway ("Soo" System), entered service as warehouseman and brakeman in 1869, when 21 years old, with Chicago, Milwaukee & St. Paul Railway; rose through various offices to assistant superintendent Iowa and Dakota divisions same road 1869-84; superintendent Minneapolis & Pacific R. R. 1884-88; with "Soo" since 1888 in consecutive offices from superintendent up to president in 1909 and present position since 1922.

C. E. SCHAFF
—J. C. Straus, St. Louis

Charles E. Schaff, president Missouri-Kansas-Texas Lines, entered service in 1871, when 15 years old, as brakeman; held various positions on different roads up to general superintendent Peoria & Pekin Union Railway in 1893; assistant to president Cleveland, Cincinnati, Chicago & St. Louis Railway, and general manager same road 1894-1906; 1906-12 vice-president New York Central Lines at

Chicago; present position since 1912.

William Sproule, president Southern Pacific Company, entered railway service as freight clerk Southern Pacific Co. 1882; general traffic manager same 1898-1906; out of service 1906-11 with the American Smelting and Refining Co. and president of Wells Fargo & Co.; re-entered service in 1911 and since as president of the Southern Pacific. During the war Mr.



WILLIAM SPROULE

Sproule was district director of the Central Western Region.

WILLIAM B. STOREY
Moffet, Chicago

W. B. Storey, president Atchison, Topeka & Santa Fe Railway, began railway service as axeman at age of 20 years; after working one year took a college course and re-entered railway service in 1881; engineer with United States Hydraulic Mining Commission at 36; re-entering railway service in 1895 he was chief engineer and general superintendent of the San Francisco & San Joaquin Valley Ry. until 1900; chief engineer of Santa Fe at Topeka Kansas 1900-

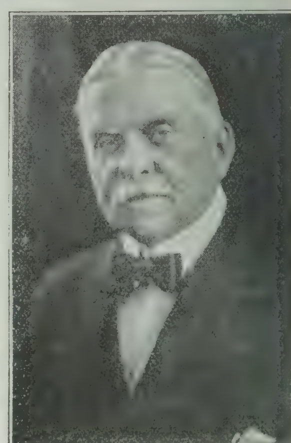
JAMES E. TAUSSIG

Wabash Railway 1915; vice-president 1916-18; Federal manager 1918-20, and present position since 1920.

William H. Truesdale, president of the Delaware, Lackawanna & Western R. R., entered service of Rockford, Rock Island & St. Louis R. R. (now part of C., B. & Q. System) as clerk in the auditing department in 1869, when 18 years old; with a legal firm in charge of railway affairs 1874-76; assistant to receiver and treasurer of the Logansport, Crawfordsville & Southwestern R. R. (now part of the Vandalia line); assistant to president of the

1909; vice-president in charge of construction and operation 1910-20 and president since 1920; succeeding the late E. P. Ripley.

J. E. Taussig, president Wabash Railway, entered railway service as an apprentice in the machine shops of the St. Louis Bridge & Tunnel Company in 1882, when 17 years old; rose through various positions with different roads to be assistant to general manager of the Wheeling & Lake Erie Railway in 1900; assistant to president of the



WILLIAM H. TRUESDALE
—Underwood & Underwood

Chicago, St. Paul, Minneapolis & Omaha Railway 1881-82; president and receiver of the Minneapolis & St. Louis Railway 1887-94; vice-president and general manager of the Chicago, Rock Island & Pacific Railway 1894-99; president of the Delaware, Lackawanna & Western Railway since 1899.

FRED'K. D. UNDERWOOD
—Underwood & Underwood

Frederick D. Underwood, president of the Erie Railroad, entered service of the Chicago, Milwaukee & St. Paul Railway as clerk and brakeman in 1870 when 18 years old; general manager in charge of construction of the Minneapolis & Pacific Railway (now part of the "Soo" System) in 1886; general manager of the Minneapolis, St. Paul & Sault Ste. Marie Railway 1886-99; 1899-1901 vice-president of the Baltimore & Ohio R. R., present position since 1901.

S. DAVIES WARFIELD

S. Davies Warfield, president and chairman of Board, Seaboard Air Line Railway Company; member of the Greater Seaboard Committee 1898-1900, which consolidated and organized the Seaboard

Air Line Railway System; became chairman of Board in 1912 upon reorganization of the property. Present position since 1918. Mr. Warfield was the founder and is president of The Continental Trust Company of Baltimore; also organized and is president of the National Association of Owners of Railroad Securities. This association initiated and presented to Congress what became the fundamental section of the Transportation Act of 1920, viz, Section 15a. Other proposals of the association are embodied in other sections of that act.


OTIS P. VAN SWERINGEN

Otis P. and M. J. Van Sweringen, Chairman and Vice-President, respectively, of the New York, Chicago & St. Louis Railroad.

During the progress of this work the railway door of opportunity swung inwards to these ambitious brothers who, as their portraits indicate, are still in the early forties. Both were educated in public schools. They first attracted attention as real estate dealers in Cleveland, Ohio, planning and carrying through one of the largest suburban subdivisions in that city. In 1916 they organized the "Nickel Plate Securities Corporation" to hold and control the New York, Chicago & St. Louis Railroad ("Nickel Plate"), which was acquired from the New York Central Railroad in July of that year. With the backing of large Cleveland moneyed interests the brothers set out to organize a merger of a number of operating lines with an aggregate mileage of nearly 10,000. The lines mentioned included the following: the "Nickel Plate," Erie, Pere Marquette, Hocking Valley,

and Chesapeake & Ohio. If the brothers succeed in perfecting their ambitious undertaking, and secure the approval of the Interstate Commerce Commission, whose tentative plan of railway consolidations it traverses in several instances, they will find themselves at the head of one of the great railway systems of the world.

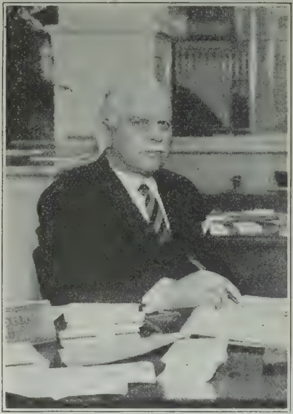
M. J. VAN SWERINGEN
—Wide World Photos.

Edward F. Carry, president of the Pullman Company, who found his railway door of opportunity through the closely allied Pullman service on its manufacturing side, was born in Fort Wayne in 1867; educated in the public schools, pushed his way up to general manager of the American Foundry Company by 1899, going thence to the Haskell-Barker Car Company, as president, in 1915; during the war was director of operations under the United States Shipping Board, and also Chairman of the Port and Harbor Facilities Commission, resigning in 1919; three years later was elected to his present position.

EDWARD F. CARRY
President Pullman Co.

Chiefs of the Big Four

To this list of railway officials who have "made good" from various starts by service to the public in administrative service may be added the chiefs of the "Big Four" Brotherhoods, who have made good through service to their fellow employes.



WARREN S. STONE
—International Newsreel Photo
Died June 12, 1925.

Warren S. Stone, grand chief Brotherhood of Locomotive Engineers, entered service of Chicago, Rock Island & Pacific Railway in 1879, when 19 years old; promoted to engineer in 1894; appointed to succeed Grand Chief Arthur in 1903 and elected to present position in 1904 and president of the Co-operative National Bank of Cleveland (first of its kind in United States) in 1920.

Lucius E. Sheppard, president of the Order Railway Conductors, entered service of the Pennsylvania R. R. in 1881, when 18 years old; conductor 1883; member of the Government Arbitration Board between eastern railways and conductors and trainmen 1913; member of President Wilson's first Industrial Conference 1917; member Railway Adjustment Board 1918; present position since 1919.

L. E. SHEPPARD

D. L. Robertson, president of the Brotherhood of Locomotive Firemen and Engine-

W. G. LEE—ABOUT 1884

men, entered service of the Pennsylvania R. R. in 1895, in his 19th year, in the capacity of engine wiper, then

D. L. ROBERTSON

W. G. LEE
—Harris & Ewing, Washington, D. C.

went to the Erie, serving successively as hostler, locomotive fireman and locomotive engineer from 1898 to 1913. From 1905 to 1913 he was grand chairman of his order for the Erie System; vice-president of the Brotherhood 1913-1922; elected president June, 1922.

William G. Lee, president of the Brotherhood of Railway Trainmen, entered service as brakeman at Emporia, Kansas, on the Atchison, Topeka & Santa Fe Railway in 1879, when 20 years old; brakeman and conductor un-

til 1884; deputy recorder of deeds Ford County, Kansas, four years; conductor Union Pacific from 1889 to 1895; first vice president Brotherhood of Railway Trainmen 1895-1909; present position since 1909.

* * * * * *

With these brief notes the demonstration of the open door of opportunity and service in the railway field must close. Though it were to "stretch out to the crack of doom," changing with each moon, it could not illustrate more clearly the democratic nature of railway service. Not a single man in this list has reached his position of authority and responsibility by any royal road of chance, birth, education or "pull." The spade in the hand has been worth more than the silver spoon in the mouth to all of them. Each in his time and place has "made good" and the directors of more than two hundred roads are on the alert for men with the like executive talents to succeed the veterans of today. The men named above are merely near the apex of the pyramid of railway labor whose base includes the half million clerks, section men and shop helpers enlisted in an occupation whose highest rewards are open to all that have the ambition, will and capacity to rise.

No educational or social test limits the opportunity in railway service. There are several college graduates among those named, but the marked majority have entered the lists without any education beyond the grammar classes of the public schools. They have all graduated in the school of observation, experiment and experience. As the late A. H. Smith of the New York Central said: "Ninety-five per cent of the railway problem is human." The railway official who does not study men does not get very far. The link of human sympathy is the most important link in the chain that stretches from the president's chair to the loneliest cabin on the line.

It is upon the human sense, the bond of sympathy between railway managers and railway employes, the source from which all graduate, that the peaceful, progressive administration of transportation depends. This is something that no

laws or regulation can establish or promote. It is the essential factor in the brotherhood of man. Upon it rests the continuous success of American railways.

A Word in Conclusion

In the preceding chapters no attempt has been made to present an exhaustive history of American railways. That would require at least a dozen volumes each the size of this and then would leave much of the field unexplored and unrepresented. The story of the development of the locomotive alone from anything like original data would call for years of research and the possession of technical knowledge and expert skill in selection and assembling of the material far beyond the aim of this primary history. The evolution of passenger and freight cars, including the post office car and the railway mail service, would fill another volume. Railway accidents, inseparable from the speed, weight and multiplication of transportation units, and the innumerable rules and devices adopted to reduce them to a minimum, would justify separate treatment. It is a gratifying fact that, proportionately to the forces and risks of railway operation, fatalities in train accidents have been reduced practically 73 per cent. This statement is borne out by the following figures:

Fatalities in Railway Accidents

			Other Persons		
Year.	Passengers.	Employes.	Trespassers.	Non-Trespassers.	Total
1922....	200	1,241	2,431	2,454	6,326
1890....	286	2,451	3,062	536	6,335

Note that the total fatalities in 1922 were practically the same as in 1890, the first year for which similar figures were available. During the same period the growth of railway traffic is reflected in the following statement:

Year.	Passengers Carried 1 Mile.	Freight Tons Carried 1 Mile.
1922..............	35,663,147,324	341,018,000,000
1890..............	11,847,785,617	76,207,000,000
Increase	23,815,361,707	264,811,000,000
Increase (per ct.)	200	347

If fatalities had increased relatively to traffic, the mortality in 1922 would have been over 23,500 instead of 6,326. The fatalities to non-trespassers include those of automobile parties at crossings and should be classed as suicides.

The genesis and expansion of railway unions, until they practically include the entire working staff outside of the executives and leading officials, might well be made the subject of a large volume, which should include brief biographies of their leading spirits. A companion volume would be needed to cover strikes and threatened strikes and legislative attempts to deal with imperiled transportation.

The Interstate Commerce Commission in Session.

Reading from Left to Right—Commissioners Cox, Campbell, Aitchison, McChord, Hall, (Chairman), Meyer, Eastman, Esch, Lewis and McManamy. Commissioner Potter declined to pose for the camera.

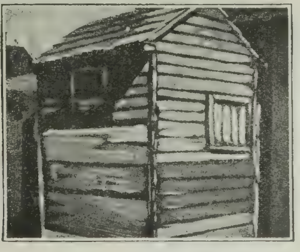
No history of American Railways would approach completeness that did not devote at least one or two volumes, as large as this, to a digest and analytical review of the hearings, rulings and reports of the Interstate Commerce Commission from 1887 down. From a membership of five the Commission has gradually been expanded to eleven. The accompanying illustration shows the Commission sitting in banc.

In the conscientious exercise of its functions, which have been expanded from Regulation to Administrative Control since 1887, rests the future of American railways. The Commission, or a majority of it, is independent of all outside influences, unless its judgment may be occasionally forced by the Railroad Labor Board, as in 1920, in the matter of wages

and conditions of employment. It might be relieved of this by Act of Congress vesting in the Commission the right to review decisions of the Board tending to force advances in rates and fares.

When all other railway history was exhausted there would remain the rise of railway architecture from the first shanty built to shelter the ticket seller of the Delaware & Frenchtown Railway down to the monumental structures illustrated in the preceding chapter and the last word in union stations nearing completion in Chicago as this *History* goes to press.

It is not known definitely where the first railway station in America was built. It may have been, and probably was, in Baltimore or at either end of the Camden & Amboy Railway. But here is a picture of what is claimed to be the first ticket office—which may well serve as a tailpiece to this story.



THE FIRST TICKET OFFICE
Delaware & Frenchtown Ry.

—Copyright K. D. Ganaway, Chicago

THE EXPRESS*

By R. Gorell Barnes

I.

When a stillness reigns in the country lanes
  And the wayside station's bare,
Stirs a faint, far hum that seems to come
  From the spirits of the air;
And the long rails thrill with a murmur till
  There's a bursting shell of sound,
A clattering roar, like the rumble of war,
  And a trembling of the ground—
A scudding blast has come and passed
  With a shriek as of tortured souls,
And along the track is the echoing back
  That slowly to silence rolls.

*From **Love Triumphant and other Poems**—Longmans, Green & Co., 1913.

It is I the proud, the strong,
  I who sway the lives of men,
Beating out my deathless song
  As I speed through field and glen.

II.

I romp with the dawn and startle the fawn
  From his couch in the moorland glade
And merrily shake the cattle awake
  As they dream in the noontime shade:
I am plodding on when the sunlight's gone
  And mortals homeward creep,
And I hammer my tune in the light of the moon
  When the world is locked in sleep.
I cleave the night with my gleams of light
  And my heart's glow bursting forth,
And behind me I throw in a glittering bow
  The diadems of my wrath.
    O'er the hill, along the plain,
      Through the forest speeding,
    On the prairie's stretching miles
      With fierce hunger feeding,
    I am where the bison was,
      All the earth exploring,
    Through the gorge and to the heart
      Of the mountain boring,
    'Cross the river, by the sea,
      Onward rushing, roaring.

III.

I join the hands of distant lands,
  With my sister of the sea,
And I grapple with space as I onward race
  And fling it away from me.
A mortal pack do I bear on my back
  And I roll with the wheels of fate,
For asunder I tear the arms of despair
  And I stay not for love nor hate.
I hurl a life far on my rollicking car
  As the breezes toss a feather;
And I fill the great net that Labor has set
  And huddle the world together.
I fling wide the door to the valley and moor
  And unfetter the laughter of men,
And I strew on the coast a great holiday host—
  Which I gather to work again.

IV.

I am weighted down with the spoils of the town
  And the harvest of the field:
Gaunt Famine shrinks back at my sudden attack
  And Plenty stands there revealed.
Though I travel afar as the servant of War,
  I am fostermother of Peace;
I bind the world's charms on her outstretched arms
  And bring to her power increase.
In my strength and my pride am I deified
  As the emblem of mortal command,
For I spread o'er the world with the banner unfurled
  On the march of a mighty band
And lead a great train, like a thought through the brain,
  To illumine the darkest land.
The chimney tall starts up at my call
  And the factory whistle screams,
As from slumber I wake the shores of the lake
  And shatter the valley's dreams.
I am clad in the dress of stern usefulness
  And I build with a tyrannous rage:
In my pride I roll on over all that is gone
  And I reck not of Beauty nor Age.
      For I am Progress, I am Power,
        I am the spirit of today:
       I fell the forest, clear the glade,
        I drain the marsh and crowd the earth.
      I roll onward, ever on
        Down my God-appointed way,
      Herald of the breaking morn,
        Calling to a nobler birth
      All the forces yet unborn
        And the greatness still to be.

Some Works That Have Been Consulted

In the preparation of this History, extending over twenty years, almost countless authorities on the different phases of railway organization, promotion, financing, construction, operation, regulation, etc., have been consulted—and partly assimilated. The names of those that have been of the most assistance follow:

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addresses, and other ephemeral literature on railway subjects passing in review during twenty-two years devoted to the study of current railway affairs. If the reader has any curiosity to judge the exhaustless fund of printed matter on all phases of rail transportation, he is referred to "The Catalogue of Books on Railway Economics," a volume of 446 pages gotten out by the Bureau of Railway Economics, Washington, D. C., 1912. It would take another volume almost as large to bring this Catalogue up to date.

* * * *

To the enumerated and unenumerated sources of information, detailed and general, which have contributed in printed page, spoken word or illustration to this outline sketch of the second most essential industry in the United States, most sincere acknowledgement is unqualifiedly made. Only the narrative thread that binds the scraps together is "mine own."

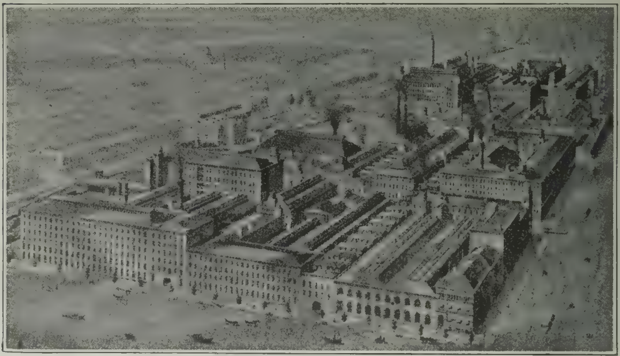
SLASON THOMPSON.

February 12, 1925.

ADDENDA A

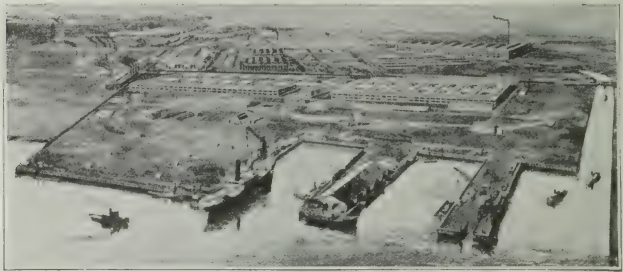
The Baldwin Locomotive Works

Scattered through the pages of this *History* will be found small cuts showing the progress in the design and manufacture of locomotives attributed to Matthias W. Baldwin and the company perpetuating his name. Beginning with "Old Ironsides" at the very dawn of railway development on this continent, the list now numbers over 58,000, of almost every description and size from a few tons apiece up to the giant articulated Mallet of over 430 tons.



HEAD OFFICE AND WORKS, PHILADELPHIA, 19.6 ACRES.

During the Great War a large part of the locomotive plant was converted into a munition factory, which before its end was credited with the following output: 6,565,355 3-inch shells, 1,959,974 rifles, 1,863,900 cartridge shells besides large quantities of miscellaneous munition items. The aggregate value of its war contracts with those of the Standard Steel Works and other subsidiaries, including locomotives, was approximately $250,000,000.



EDDYSTONE PLANT ON DELAWARE RIVER 616 ACRES.

ADDENDA B

Growth of American Railways

Within a century, from an insignificant tramway carrying granite blocks for Bunker Hill Monument, the railways of the United States, by decades, have shown the following amazing growth:

States	1835	1840	1850	1860	1870	1880	1890	1900	1910‡	1920‡
Alabama	46	46	75	743	1,429	1,851	3,148	4,219	5,022	5,377
Arkansas	....	....	....	38	256	896	2,113	3,341	5,135	5,052
California	....	....	....	23	925	2,220	4,148	5,744	7,655	8,356
Colorado	....	....	....	......	157	1,531	4,154	4,587	5,519	5,519
Connecticut	....	102	402	601	742	954	1,007	1,023	1,000	1,001
Delaware	16	39	39	127	224	280	328	346	335	335
Florida	....	....	21	402	446	530	2,390	3,272	4,370	5,212
Georgia	....	185	643	1,420	1,845	2,535	4,105	5,639	7,020	7,326
Idaho	....	....	....	......	......	220	941	1,261	2,168	2,877
Illinois	....	....	111	2,799	4,823	7,955	9,843	10,997	11,876	12,188
Indiana	....	....	228	2,163	3,177	5,454	5,891	6,469	7,420	7,426
Iowa	....	....	....	655	2,683	5,235	8,347	9,180	9,733	9,808
Kansas	....	....	....	......	1,501	3,439	8,806	8,719	9,007	9,388
Kentucky	15	28	78	534	1,017	1,598	2,694	3,059	3,518	3,929
Louisiana	40	40	80	335	479	633	1,658	2,824	5,469	5,223
Maine	....	11	245	472	786	1,013	1,313	1,915	2,248	2,295
Marland and D. C.	117	213	259	386	671	1,012	1,168	1,407	1,413	1,472
Massachusetts	113	301	1,035	1,264	1.480	1,893	2,094	2,118	2,109	2,106
Michigan	....	50	342	779	1,638	3,931	6,789	8,193	8,985	8,734
Minnesota	....	....	....	......	1,072	3,108	5,466	6,942	8,669	9,114
Mississippi	....	....	75	862	990	1,183	2,292	2,919	4,413	4,369
Missouri	....	....	....	817	2,000	4,011	5,897	6,867	8,078	8,117
Montana	....	....	....	......	......	48	2,181	3,010	4,207	5,072
Nebraska	....	....	....	......	1,812	2,000	5,274	5,684	6,067	6,166
Nevada	....	....	....	......	593	769	925	909	2,277	2,160
New Hampshire	....	53	467	661	736	1,015	1,133	1,239	1,246	1,252
New Jersey	99	186	206	560	1,125	1,701	2,034	2,237	2,255	2,352
New York	104	374	1,361	2,682	3,928	6,019	7,462	8,121	8,416	8,390
North Carolina	....	53	154	937	1,178	1,499	2,904	3,808	4,734	5,522
North Dakota	....	....	....	......	35	635	1,940	2,731	4,201	5,311
Ohio	....	30	571	2,946	3,538	5,912	7,719	8,774	9,128	9,002
Oklahoma	....	....	....	......	......	275	1,213	2,150	5,978	6,572
Oregon	....	....	....	......	159	582	1,269	1,723	2,279	3,305
Pennsylvania	318	754	1,240	2,598	4,656	6,243	8,307	10,277	11,084	11,551
Rhode Island	....	50	68	108	136	210	212	212	212	211
South Carolina	137	137	289	973	1,139	1,429	2,096	2,795	3,410	3,814
South Dakota	....	....	....	......	30	630	2,485	2,850	3,948	4,276
Tennessee	....	....	....	1,253	1,492	1,824	2,710	3,124	3,809	4,078
Texas	....	....	....	307	711	3,293	7,911	9,873	14,243	16,125
Utah	....	....	....	......	257	770	1,090	1,547	1,986	2,161
Vermont	....	....	290	554	614	912	913	1,012	1,081	1,077
Virginia	93	147	384	1,379	1,486	1,826	3,142	3,729	4,443	4,703
Washington	....	....	....	......	......	274	1,699	2,890	4,858	5,587
West Virginia	....	....	....	......	387	694	1,306	2,198	3,526	3,996
Wisconsin	....	....	20	905	1,525	3,130	5,468	6,496	7,328	7,554
Wyoming	....	....	....	......	......	472	941	1,228	1,600	1,931
Arizona	....	....	....	......	......	384	1,061	1,511	2,097	2,478
New Mexico	....	....	....	......	......	643	1,284	1,752	2,999	2,972
Alaska	....	....	....	......	......	......	....	....	....	246
Total	1,098	2,818	9,021	30,635	52,922	93,671	159,271	192,940	238,609	253,090

‡Exclusive of switching and terminal companies—1,614 miles in 1910; 1,743 miles in 1920.

ADDENDA C

Three Decades of Railway Progress

Item (m=Thousands)	1893	1903	1913	1923	1923 Over 1892 %
Population	66,970,496	80,983,390	96,512,407	112,000,000	67.3
Miles of Lines (operated)	169,780	205,313	253,470	248,816	46.6
Miles of All Track	221,864	283,821	379,508	404,414	82.3
Net Capitalization (m)	$8,831,603	$10,281,598	$15,330,131	$19,468,095	120.5
Net Cap. per Mi. of Line	50,293	51,559	60,481	78,242	55.5
Net Cap. per Mi. of Track	39,818	36,222	40,395	48,139	20.9
Revenues from Operation (m)	1,220,751	1,900,846	3,125,136	6,413,230	425.7
Revenues per Mile Operated	7,190	9,268	12,329	25,775	258.5
Expenses of Operation (m)	827,921	1,257,538	2,169,969	4,990,828	502.8
Exp. of Op. per Mi. Operated	4,876	6,125	8,561	20,058	311.5
Net Rev. from Operation (m)	392,830	643,308	955,167	1,422,402	262.7
Net Rev. per Mile Operated	2,314	3,133	3,768	5,717	147.0
Ratio of Exp. to Revenues	67.82%	66.16%	70.02%	77.82%	14.7
Receipts from Pass. (m)	$301,492	$421,705	$695,988	$1,153,571	282.5
Receipts from Freight (m)	829,054	1,338,020	2,198,931	4,662,050	462.3
Receipts from Mail (m)	28,445	41,709	50,053	93,756	229.6
Receipts from Express (m)	23,631	38,331	78,536	153,744	558.6
			1,043,603	992,523	67.2
Passengers Carried (m)	593,561	694,891			
Passengers Carried 1 Mi. (m)	14,229,101	20,915,764	34,672,685	38,049,173	167.4
Avg. Receipts per Pass. Mile	2.108	2.126	2.006	3.032	43.8
Avg. Passengers in Train	42	46	55	66.8	59.0
Avg. Journey per Pass. (m)	23.97	30.10	33.31	38.3	61.1
Freight Tons Carried (m)	745,119	1,304,394	2,058,035	2,411,239	223.6
Freight Tons Car. 1 Mi. (m)	93,588,112	173,221,279	301,730,291	414,347,458	342.8
Avg. Receipts per Ton Mile (mills)	8.78	7.63	7.29	11.25	28.1
Average Tons in Train	184	310	445	662	260.0
Avg. Haul per Ton (miles)	125.60	132.80	144.40	172	36.9
Locomotives (number)	34,788	43,871	65,597	66,964	91.9
Locomotives Weight without Tender (tons)	1,565,460	2,606,587	5,247,760	6,897,292	340.7
Passenger Cars (number)	31,384	38,140	52,717	55,020	75.0
Freight Cars (number)	1,013,307	1,653,782	2,273,564	2,359,685	132.7
Freight Cars Capacity (tons)	24,319,200	48,622,125	86,988,595	100,818,376	314.5
Employes (number)	873,602	1,312,537	1,864,303	1,904,807	118.0
Emp. per 100 Mi. of Line	515	639	730	766	44.1
Employes Compensation	$488,360,400	$775,321,415	$1,405,080,826	$3,077,945,911	530.3
Proportion of Gross Earnings	40%	40.78%	43.99%	47.99%	19.9
Prop. of Operating Expenses	59.05%	61.65%	63.29%	61.67%	4.4
Per Employe per year	$558	$591	$797	$1,616	189.6
Taxes	$36,514,689	$57,849,569	$127,331,960	$340,632,054	832.9
Per Mile of Line	215	282	524	1,369	536.7
Proportion of Gross Earnings	2.99%	3 04%	4.08%	5.31%	77.6

ADDENDA D

Ownership of American Railways

Starting with a few millions hestitatingly invested by adventurous spirits in Boston, New York, Philadelphia, Baltimore and Charleston, and loaned by speculative capitalists of Great Britain and Holland, the capital stock of American railways is now held by nearly a million shareholders, while their bonds have an equally wide distribution, almost all held in America. The number of stockholders in 30 leading roads reported in 1923 was as follows:

Name of Company	Shareholders Dec. 31, 1923
Pennsylvania R. R.	142,527
Atchison, Topeka & Santa Fe	67,118
Southern Pacific	60,662
Union Pacific	52,532
Great Northern	44,742
Northern Pacific	37,991
New York Central	34,502
Baltimore & Ohio	33,395
New York, New Haven & Hartford	24,796
Chicago, Milwaukee & St. Paul	22,518
Chicago & North Western	20,059
Illinois Central	19,323
Boston & Maine	16,642
Lehigh Valley	16,095
Southern Railway	15,327
Erie Railroad	14,495
Chicago, Rock Island & Pacific Ry	14,426
Norfolk & Western R. R.	13,585
Delaware & Hudson	11,665
Pere Marquette	9,801
Chesapeake & Ohio	9,320
Wabash Railway	9,310
Missouri Pacific	7,936
Louisville & Nashville R. R.	6,794
Delaware, Lackawana & Western R. R.	6,758
Denver & Rio Grande	5,972
Missouri-Kansas-Texas R. R.	5,595
Atlantic Coast Line	5,025
St. Louis-San Francisco Ry	4,476
Seaboard Air Line R. R.	3,020
Total	736,407

Stock in several large roads not included in this list is held by trustees.

ADDENDA E

Growth of the World's Railways

From the folowing table the reader can get a comprehensive view of the world's railways. Great Britain, which heads the list by virtue of being first in the field of practical operation, was superseded by the United States before the end of the first decade.

COUNTRY	MILES OF ROAD COMPLETED									
	Opened	1840	1850	1860	1870	1880	1889	1899	1910	1921*
Great Britain	1825	1,857	6,621	10,433	15,537	17,933	19,943	21,666	23,280	23,733
United States	1827	2,818	9,021	30,626	52,922	93,296	160,544	189,295	236,422	250,983
Canada	1836	16	66	2,065	2,617	7,194	12,585	17,250	24,731	39,771
France	1828	.....	1,714	5,700	11,142	16,275	21,899	26,229	29,364	¶32,030
Germany	1835	341	3,637	6,979	11,729	20,693	24,845	31,386	36,235	34,689
Belgium	1835	207	554	1,074	1,799	2,399	2,776	2,883	2,888	2,913
Austria (proper)	1837	.....	817	1,813	3,790	7,083	9,345	11,921	13,591	14,434
Russia	1838	.....	310	988	7,098	14,026	17,534	26,889	35,347	‡49,081
Italy	1839	13	265	1,117	3,825	5,340	7,830	9,770	10,425	9,747
Holland	1839	10	110	208	874	1,143	1,632	1,966	2,235	2,389
Switzerland	1844	.....	15	653	885	1,596	1,869	2,342	2,791	3,246
Hungary	1846	.....	137	1,004	2,137	4,421	6,751	10,619	12,177	14,152
Denmark	1847	.....	20	69	470	975	1,217	1,764	2,121	2,635
Spain	1848	.....	17	1,190	3,400	4,550	5,951	8,252	8,961	9,517
Chili	1851	.....	.....	120	452	1,100	1,801	2,791	3,451	5,395
Brazil	1851	.....	.....	134	504	2,174	5,546	9,195	11,863	17,438
British India	1853	.....	.....	838	4,771	9,162	15,887	23,523	30,809	36,735
Norway	1854	.....	.....	42	692	970	970	1,231	1,608	2,037
Sweden	1856	.....	.....	375	1,089	3,654	4,899	6,663	8,321	9,287
Argentine Republic	1857	.....	.....	.....	637	1,536	4,506	10,013	14,111	21,161
Turkey in Europe	.....	.....	.....	41	392	727	1,024	1,900	1,967	1,236
Peru	.....	.....	.....	47	247	1,179	993	1,035	1,470	1,889
Portugal	.....	.....	.....	42	444	710	1,118	1,475	1,689	2,047
Greece	1869	.....	.....	.....	6	7	416	604	845	1,507
Uruguay	1869	.....	.....	.....	61	268	399	997	1,371	1,636
Mexico	1868	.....	.....	.....	215	655	5,012	8,503	14,845	15,805
Roumania	.....	.....	.....	.....	152	859	1,537	1,920	1,976	7,240
Australia†	.....	.....	.....	.....	.....	789	4,850	11,111	17,956	26,143
Japan	1874	.....	.....	.....	.....	75	542	3,632	5,130	6,202
China	1883	.....	.....	.....	.....	.....	124	401	4,997	6,836
Africa	.....	.....	.....	.....	.....	583	2,873	5,353	19,207	25,647

*Or latest figures. ¶Includes industrial and local railways. †Including New Zealand. ‡Including Finland and Asiatic railways.

Under the treaty of Versailles there has been such a readjustment of boundaries and creation of new states carved out of old, that the next decade will have to take account of the railways of Czechoslovakia, Poland, Lithuania, Latvia, Estonia, Jugoslavia and Albania, at the expense of several of the better known European countries.

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*Indicates illustration.

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